

Principal Errata

Page	Line	Error	Improvement
III-6	22	Diagram (fig.3.4.1)	Diagram (fig. 3.3.2)
III-10	1	Diagram 1.2.2.	Diagram 1.2.1.
III-10	6	(Fig. 3.4.1)	Fig. 3.3.2
III-17	19	(Table 3.4.3.)	Table 3.4.2
III-17	21	(Table 3.4.4.)	Table 3.4.3
IV-5	5	(Table 3.1.1)	Table 3.4.1
B-17	16	(See table B.1.0 (6)	Table B.1.0.b.

AN INTEGRATED RECONNAISSANCE SURVEY
OF THE
ANGUS DISTRICT
TAYSIDE, SCOTLAND
VOLUME I

Part I: General Report
Part II: Sectoral Reports

1981

IIC-UNESCO CENTRE FOR INTEGRATED SURVEYS
ENSCHEDF, THE NETHERLANDS



FOREWORD

This report represents the final outcome of an Integrated Study carried out in the Angus District of the Tayside Region in Scotland. The study was executed within the context of the Post-graduate course in Integrated Surveys for multidisciplinary investigations in development planning of the ITC-UNESCO Centre for Integrated Surveys of the International Institute for Aerial Survey and Earth Sciences (ITC) based in Enschede, the Netherlands.

It represents the analysis of various planning documents and reports, conclusions drawn from discussions with authorities and officials in the region and inputs based on observations and investigations from the team-members participating in this study. It is important to recognize this work within its correct context, first and foremost as an educational exercise and secondly as an attempt to present planning in the Angus District with the results of an integrated approach.

In its educational context the participants are well aware that various weaknesses may be recognized and therefore will welcome structural criticisms. On the other hand it is hoped that the results of this study can be utilized in the form in which it has been presented since its utility is the final treasure of the success of Integrated Surveys in Development Planning.

It should be noted that the task of satisfying this two-fold objective together with the constraints of time availability and accessibility to relevant data have been real challenges to the team.

However, we sincerely hope that the results of this study will be instrumental not only in the proper development planning of Angus District in particular and of Tayside and Scotland in general, but also in promoting the concepts of Integrated Surveys in Development Planning.

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LOCATION MAP

ANGUS
DISTRICT

T
A
Y
S
I
D
E

ANGUS DISTRICT
IN
TAYSIDE REGION

Aberdeen

TAYSIDE

Dundee

Edinburgh

000

APPENDIX 1.3

TERMS OF REFERENCE1. INTRODUCTION

In 1980 the ITC-UNESCO Centre for Integrated Surveys has carried out investigations for integrated regional development in the TAYSIDE REGION, Scotland.

In this study emphasis has been put on the existing development objectives and problems, existing resources and existing constraints per sector, and on the allocation of resources taking into account the institutional context.

In correspondence with the Terms of Reference of these investigations the Centre presented, among others, an alternative development scenario for the Region in which employment, land use and environment constituted the salient features.

Employment appeared to be the pressing problem in the Region and the investigations have revealed that the major potential of employment creation lies in the industrial sector. Industry, however, is traditionally concentrated in the City of Dundee but further improvements are hampered by inner city development problems and limitations for the urban-rural fringe area as a result of the existing Green Belt policy.

Among others, further investigations are now to be directed towards the potentials of the Angus District.

2. THE ANGUS DISTRICT

The Angus District is one of the administrative units of Tayside Region and has to be considered as dominantly rural in character although Montrose provides for North Sea Oil Exploitation supporting industries. Additional light industry and manufacturing activities are to be found in Arbroath and Forfar, while a large multi-national firm has shown interest in the use of

Buddon Barry at the mouth of the Tay Estuary for petrochemical industrial developments.

As a result of limited labour opportunities at present in the Angus District proper, employment is sought in Dundee City resulting in commuter functions of the existing towns and villages in the District.

Therefore, the socio-economic situation of the District is far from balanced and developments which may improve this situation are needed.

3. THE ASSIGNMENT

The ITC-UNESCO Centre is requested:

- to identify the main constraints to development of the Angus District
- to establish in conjunction with local planning authorities a priority setting for development intervention to alleviate the constraints on the basis of both:
 - spatial and
 - sectoral differentiation between these constraints and their relative importance.

Special attention is to be given to the physical and social rural infrastructure in the District.

Upon selection of priority areas, the present function (and possible future function) and inherent required development inputs into potential growth centres should be defined as a lead-up to a prefeasibility study.

The existing relation between sectoral policy making, planning and budgeting at various government levels is to be taken into account, in as much as this relation may impede, or accelerate specific courses of action.

4. REQUIREMENTS

The team is requested:

- a) to produce a Plan of Operation stating:
 - the survey methodology
 - the survey objectives and consequently the survey activities and their interrelations and interdependencies

- the survey techniques to be applied and equipment to be used
- b) to produce a barchart indicating the time allocation for all activities and further specified in main sectors and experts responsible.
- c) to produce a list indicating the division of tasks per sector.
- d) to produce a preliminary outline of the final report
- e) to carry out the survey
- f) to produce a final report

5) LOGISTICS

To be taken care of by ITC staff in conformity with the existing regulations and use.

6) COSTING

To be taken care of by ITC in conformity with the existing regulations.

THE TEAM

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A. Ziv	Israël	Industry

PART I. GENERAL REPORT

Chapter 1 JUSTIFICATION OF THE CHOICE OF PROGRAMME AND AREA

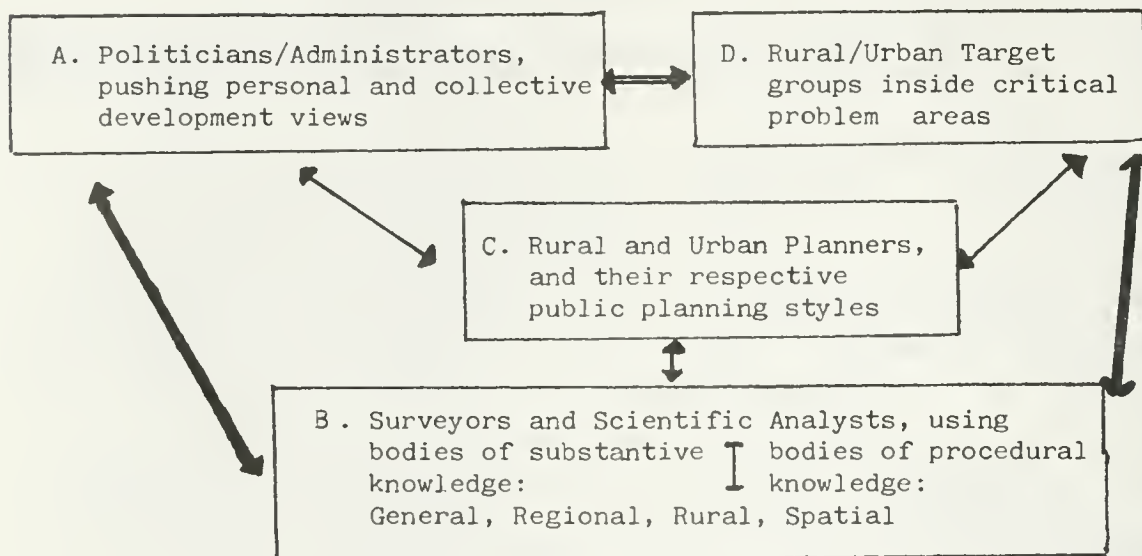
1.1. The ITC/IS Approach towards Surveys for Development Planning.

ITC and its ITC-UNESCO Centre for Integrated Surveys (IS) base their educational policy and approach towards surveys for development planning on the firm belief that effective solution of the complex and urgent development problems, facing many countries in the Third World, depends on the adoption of an efficient, integrated, multi-disciplinary, problem- and goal-oriented approach to information gathering, processing and presentation. The need for such an approach derives from both, the complexity of the development problems and the very complex nature of the socio-spatial resource systems upon which development depends. However, all over the world it is still common practice for many of the surveys, associated with development programmes and projects, to be little more than aggregates of mono-disciplinary specialist surveys. It is widely recognized, that much of the information thus gathered, is of disappointing utility for development planning and policy making. Too many survey reports are simply filed away and regretfully never used.

1.1.1. External Integration between Surveyors, Planners and Policy Makers

It is an important ITC aim to redress these inadequacies by training and educating specialists to see development programmes in a broader perspective, and to work together in an integrated way with a common purpose. One basic hypothesis underlying the ITC/IS educational programme can, therefore, be stated and visualized explicitly, as follows. In Diagram 1.1.1. external relationships are sketched, but more specifically tensions are brought forward between opposite parties as presented by the arrows:

Diagram 1.1.1. Relationships between Public Decision Making, Planning, Scientific Analyses and Surveys



Inside this triangular field of tension are then to be observed:

- A. Policy makers and chief administrators pushing their short- and long-term views vigorously;
- B. Analysts and surveyors making their bodies of scientific knowledge, -establishing facts and data-, available to decision makers, planners and rural/urban target groups.
- C. Depending on different bodies of substantive and procedural knowledge, planners are utilizing various planning styles, in order to
- D. solve critical problems of target groups.

From this triangular, but also dynamic picture, follows consequently the very one and basic ITC/IS working hypothesis as follows.

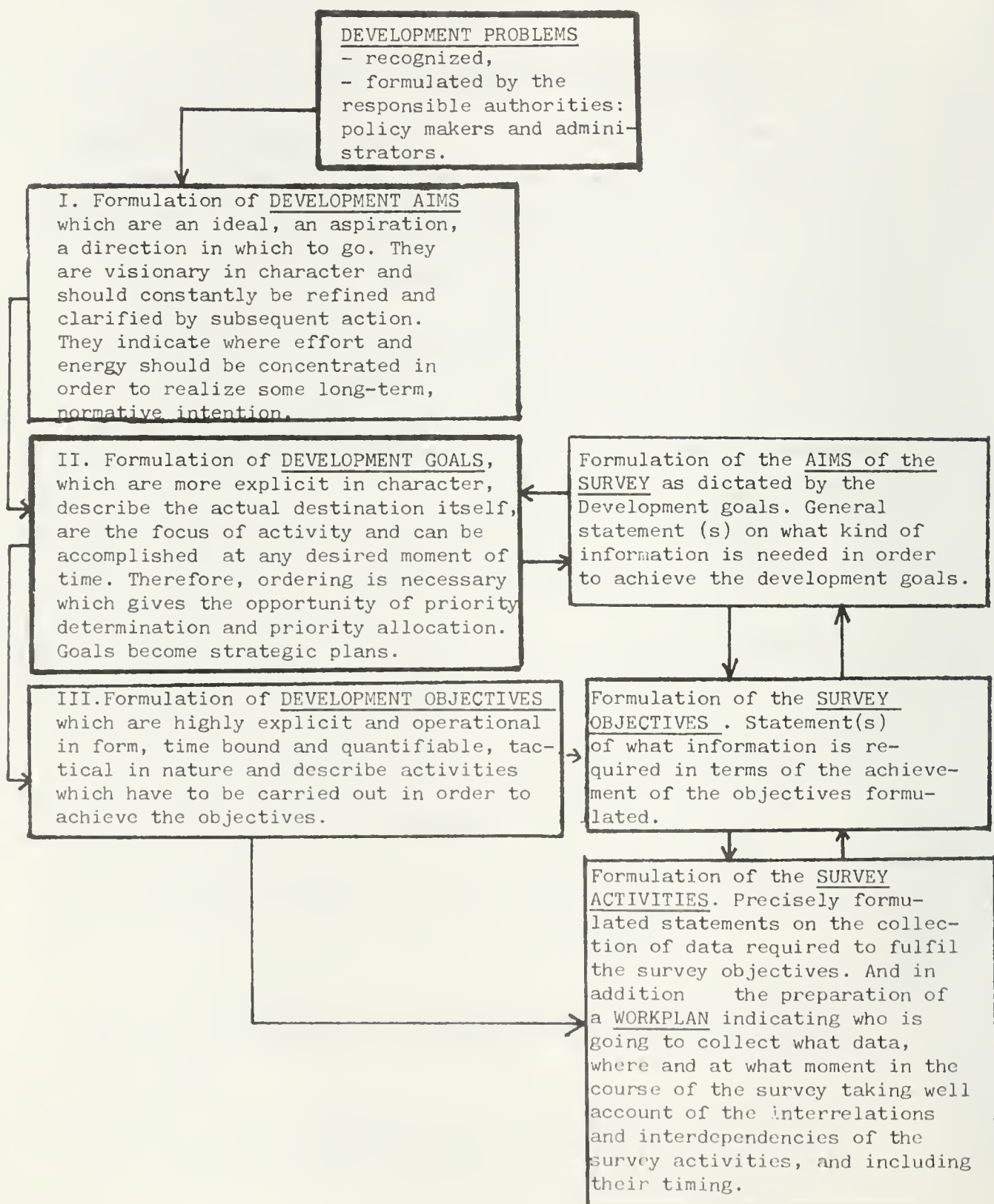
- A. Whereas development views are changing over time, emphasizing economic growth, redistribution, basic human needs or interdependent eco-development,
- B. changing bodies of knowledge and data are needed,
- C. determining public planning styles, changing over time from top-down towards bottom-up approaches, and

D. contributing towards solving problems of the rural and urban poor, viewed differently over time (A), etc., etc.

1.1.2. Internal Survey Integration

Moreover, emphasis should be laid on the proper planning and execution of the surveys themselves, and an effective presentation of survey results within the framework of development planning and decision making (Diagram 1.1.1.). Therefore, surveys designed to support a development plan should have internally a well-defined purpose with clearly formulated objectives. Survey activities should be planned in such a way that the survey data are effectively tuned to the development objectives. This view can be presented schematically in Diagram 1.1.2, showing the relationships again between development problems (D), the responsible authorities (A), development plans, aims, goals and objectives (C) and Survey design (B).

Diagram 1.1.2.: A Project Formulation Matrix



1.2. Considerations for Selection of Fieldwork Area

Generally speaking, the choice of an area to carry out an ITC/IS field-survey depends on two fundamental groups of criteria:

- the first is related to exposing participants in practice to the realities of external and internal survey integration, as explained in the preceding paragraphs 1.1.1. and 1.1.2; and
- the second is related to directing the survey towards a specific methodology such as homogeneity analysis and hierarchization of central places as explained below.

1.2.1. Learning Opportunities for External and Internal Survey Integration

As a crucial part of the Post-graduate Course in Multi-Disciplinary Surveys for Development Planning a survey in a developing area, or an area with development problems, is undertaken by the participants of the Course in close co-operation with and under the educational guidance of the ITC/IS staff appointed. This activity, called fieldwork, is structured in three main components, i.e. preparation, field investigation and data collection and reporting. The subject of the fieldwork is as closely related as possible to actual development problems in the area selected, and is formulated after close co-operation with the national, regional and local authorities concerned. It would be most convenient if the kind of development problems of the study area are comparable with those in the home countries of the participants, most of whom are from Developing Countries.

The aim of the fieldwork is to actually involve the course participants in the execution of an integrated survey for development planning with special emphasis on the preparation of a Plan of Operation (: Workplan). based on a given Terms of Reference; the design of the survey; the problem-oriented data collection and interrelations between the participating disciplines and their work; the preparation of a report of findings including conclusions and recommendations for future development and/or follow-up studies. See Diagram 1.1.2 with the Survey Project Formulation Matrix.

Because of the short duration of the fieldwork itself, -being only three weeks-, data should not only be present, but be made readily available, too. This implies contacts between people in their own contexts: policy makers, planners and surveyors at the source, collecting data, processing data and deciding on the (non)use of information produced. Consequently, participants must be able to define their questions and requests towards the various parties concerned without ambiguities. Course participants should not bore and upset those who are in command of the data; but should try to interest them in the methodology applied, and make clear that, as a study team, they function as a transfer between those who plan and decide and those who are going to be affected by the plans and decisions made.

The cooperation of officials in the field is to be very much sought. This is often difficult to obtain, because matters such as availability of time, levels of authority and pressing day-to-day problems, play decisive roles; so decisive that the final outcome of the ITC/IS fieldwork as a learning device may be doubtful sometimes.

1.2.2. Methodologies applied: Homogeneity Analysis and Hierarchization of Central Places

Part of the preparation for the fieldwork is actually taken up by the methodological design of the successive survey investigations. It was decided that for the particular set of development problems and goals in the Angus District, i.e. decreasing rural de-population, a Rural Centre Planning approach would be quite appropriate. More about the components of this approach, i.e. index and factor analyses and hierarchization of rural and urban centres, is explained in Chapter 3. The following Diagram 1.2.1. shows, anyhow, the flow of interrelated survey investigations, as planned in ITC/IS home headquarters. Adapted to the main streams in Diagram 1.1.2, the numbers in the boxes of Diagram 1.2.2 indicate the consequent follow-up of steps in the learning process.

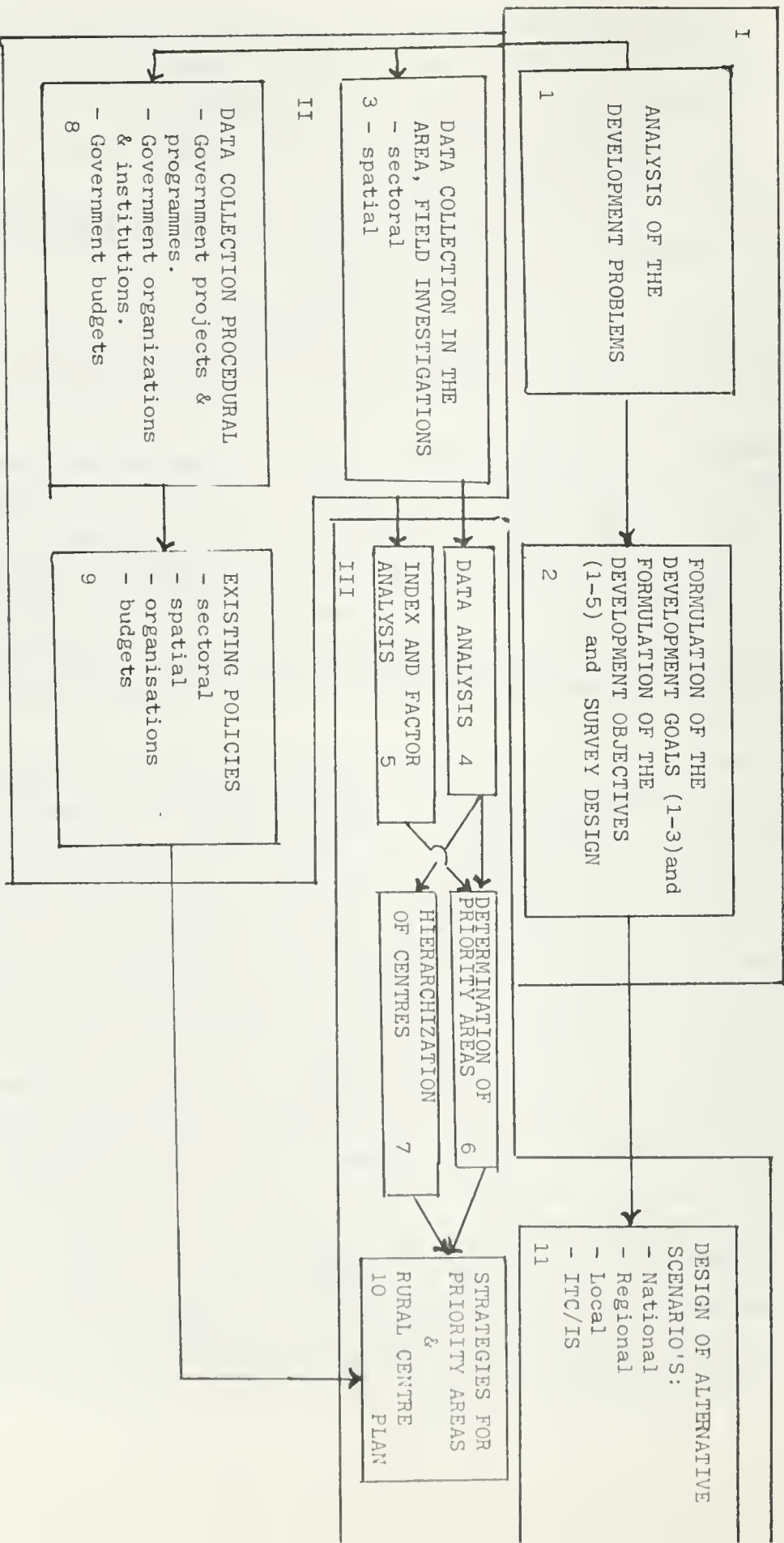
In the context of the Rural Centre Planning (RCP) approach the formulation of the survey activities at headquarters consisted of a search for variables in the various sectors which are supposed to bear discriminating power for the final comparative discrimination in the functioning of the 43 parishes of the Angus District. An example may elucidate the above.

One of the selected variables is "population density". Thus the acquisition of the population density figures for the parishes is to be translated into the following survey activities:

1. To collect the population totals per parish from the most recent population census, being taken in 1971.
2. To find and to validate criteria for amending these figures to the selected data base year of 1980.
3. To carry out this set of calculations.
4. To collect or to calculate the size of the area of the parishes.
5. To calculate the population density per parish from its population total in its area.

Within this context, a word may be said on survey activity interrelations. The population figures have obviously been collected by a demography working group. In the preparation phase it was decided that parish areas should be collected by the agriculture working group and should be made available to all other working groups in need of these data. There was therefore no such situation where all groups needing the same data were collecting them independently. This would have been a waste of effort and a waste of time.

From diagram 1.2.2. it can be seen that the planned investigations have been divided into three main blocks, labelled with Roman figures I-III: Block I the preparation at home headquarters, Block II the actual field investigations, and Block III the analysis and synthesis at home headquarters after return from the field. In practice, however, it appeared that part of Block III could be started during the last few days of the field investigations. Reasons for this most positive development were the availability of data in the various Councils and Government Services in the study area, and above all the magnanimous cooperation of all officials consulted. Their interest in the ITC/IS survey activities, their concern, their patience and their kindness in making their valuable time available has been most beneficial in terms of the progress and value of the field work. From the point of view of data collection it can be seen in Diagram 1.2.2. that the field survey was not limited to the collection of sectoral, spatial, physical and socio-economic data only. The Terms of Reference asked for a projection of these data against the procedural and existing policy framework as well.



Block I: Preparation phase at office headquarters

Block II: Fieldinvestigations and data collection

Block III: Analysis and synthesis back at office headquarters

DIAGRAM 1.2.1. : GENERAL FLOW OF SURVEY

ACTIVITIES

Here it is confessed again, as in paragraphs 1.1.1 and 1.1.2, that the interrelations and interdependencies between survey activities per se, and government projects, programmes and plans as decided upon, should precipitate in the set-up of the survey itself right from the very beginning.

As a result of the actual circumstances experienced in May 1981 during the fieldwork in the Angus District, i.e. the computerization and detail of data available as well as the positive attitude of local officials towards the ITC/IS learning process as a whole, the original sequence of RCP study steps could be modified and spelt out in greater detail. These modifications and specifications are to be discussed and visualized in Chapter 3 in which a time planning is included as well.

1.3. Survey of the Angus District 1981 : The Scottish Case

During the 1970's the ITC/UNESCO Centre for Integrated Surveys carried out its post-graduate fieldsurveys in Mediterranean countries. It was by accident that in 1980 the Centre started its survey activities in Scotland with investigations for the integrated regional development of the Tayside Region. Based on the analysis of existing planning documents and independent survey activities, the Centre published in 1980 its report consisting of:

Ch. I. The work programme for the ITC/UNESCO study (p.4).

Ch. II A General description of the natural, human and administrative resources available in the Tayside study area (maps 1 and 2).

Ch. III. An analysis of development problems (p.30) and of development objectives and priorities (pp. 42/43).

Ch. IV. Sectoral surveys regarding the key problems to be tackled in industry (p.56), agriculture (pp. 71-73), forestry (pp. 82-84), recreation and tourism (p. 95), mining and quarrying (p. 104) gas and oil (p. 109), housing (p.113), roads (p.115) public transport (p.118), social work, water supply (p.126), sewerage and electricity (p.127).

Ch. V. A summary of key development objectives and priorities sector-wise

Ch. VI. An analysis of alternative development scenarios:

- VI.1. Of the Regional Council for the Tayside Region (p.138);
- VI.2. Of the Dundee District Council (p.141) including the "Green Belt" policy for the urban fringe of Dundee (p. 141);
- VII.3. Of the ITC study team emphasizing a flexible country-side policy (p.147).

These chapters laid the foundation for the Terms of Reference specifically directed in 1981 towards the Angus District inside the Tayside Region. See Appendix 1.3, where the main interests of the fieldwork in 1981 were directed at identifying the main constraints to development in the Angus District, and to establishing priority areas for development intervention in order to alleviate these constraints on the basis of spatial and sectoral differentiation between these constraints and their relative importance. Such in conjunction with the responsible planning authorities and with special attention to the physical and social rural infrastructure in the Angus District.

It was also realized that the existing relation between sectoral policy making, planning and budgeting at the various government levels had to be taken into account, in as much as this relation may impede or accelerate specific courses of action.

Upon selection of priority areas the present function, possible future function and inherent required development inputs into potential growth centres should be defined as a lead-up to relevant, prefeasibility studies. During the preparation of this survey, based on the project formulation matrix of Diagram 1.1.2 , and after analysis of the Regional Report, 1978, and the Tayside Structure Plan, 1980 (Tayside Regional Council), development problems, aims and objectives for the Angus District were recognized as presented in Chapter 2.

The aim of the survey being "to conduct an integrated reconnaissance survey with recommendations leading towards prefeasibility studies", the following five survey objectives were formulated during April 1981, - thus forming the basis for the definition of the survey activities:

- 1) To identify the development potentials in the Angus District.
- 2) To determine the problems/constraints in the existing supply of services and utilities in the area.
- 3) To prioritize development programmes with the aim of removing the constraints with consideration of the spatial and sectoral dimensions.
- 4) To assess the existing and potential growth functions in priority areas alongside the overall development framework.
- 5) To examine the existing administrative framework within which policy making, planning and budgeting operate with the end in view of positively directing courses of action for development.

For practical purposes, the entire team was divided into seven sectoral working groups: Housing & Demography, Agriculture/Land Use, Industry, Transport, Water supply & Sewage, Rural Centres & Social Infrastructure (Health, Education and Tourism), Development Administration & Finance. Within these groups and based on the survey objectives, survey activities have been formulated. Most important, and laid down in a document, popularly called "the to and froms", the interrelations between the various survey activities have been identified. In order to complete a certain survey objective, therefore, various kind of data have to be collected. This as such is not done by just one working group, but by two or more that share responsibility for that particular survey objective. This invariably means that partial data collection has to be properly timed and that sufficient flexibility has to be built in to cope with unexpected drawbacks.

After the preparatory month of April 1981 at ITC Headquarters, the fieldwork was carried out during May 1981 in the Tayside Region, as reported below in this General Report and the eleven Sectoral Reports. Being used to work in French speaking Mediterranean countries, the experiences of 1980 and 1981 happened to be quite pleasurable ones:

- Course participants could work the documents and reports independently, - accompanying ITC/IS staff not longer being required to act as translators.
- The same holds for the interviews with authorities and Government officials working in a language which is mastered by all parties involved means much greater understanding and leads to much better educational results.

- The accompanying ITC/IS staff could devote much more time to holding the methodological strings of the Angus learning device, viewed as a whole and sector-wise.

Putting all the aforecited bits together, it appears that the Scottish environment forms a favourable environment for ITC/IS educational purposes. It didn't take too much consideration to return in 1981 to Scotland, and to prepare and execute the fieldsurvey which is reported in this document.

CHAPTER II.

2.1. General Description of the Area

2.1.1. General

Angus District is one of the 3 districts of Tayside Region and is located in the South East of Scotland. Its total area is about 211,200 ha (or 26% of Tayside) of which 40% is under agriculture.

Scotland has about 7% of good quality soil and of this, 28% is found in the Tayside Region and particularly in Angus.

At the end of 1978 the total population of Scotland was about 5.2 million. Of this, 402,930 or 10% were in Tayside. Angus District had about 92,000 or 23% of the region's total at this time (See table 2.1a). As much as 80% of this population were in the urban areas.

Table 2.1.a. Total population of Scotland, Tayside Region and Angus District

	1961	% change for period 1961-1971	1971	% changed period 1971- 1978	1978
Scotland	5,179,300	+ 0.9	6,227,700	- 0.9	5,179,400
Tayside	395,900	+ 0.2	396,500	+ 1.6	402,930
Angus	85,700	- 1.4	84,500	+ 8.8	91,943

Ref. Tayside Structure Plan, 1980, p. 21

As illustrated in Table 2.1.a. the total population of Angus District was increasing by 8.8% over the period 1971 to 1978. However, for Scotland as a whole the population decreased by 0.9% for the same period.

Table 2.1.b. shows that the majority of the population is employed in services and manufacturing. For Angus District the percentage of population employed in the primary sector is fairly high as compared to Tayside and Scotland as a whole. This can be explained by the high proportion of agricultural land in the Angus District as compared to other districts in the Region.

Table 2.1.b. Employment Structure in Scotland, Tayside Region and Angus District
1980

Sector	Scotland %	Tayside %	Angus %
Primary	4.1	4.7	10.8
Manufacturing	29.3	28.6	28.4
Construction	8.3	7.7	8.5
Services	58.3	59.0	52.3
	100	100	100

In general industry plays a major role in the economic development of Scotland in terms of employment generation. Traditionally, Scotland based its industry strongly on coal, iron, steel, heavy industry and textile. Recently, however, the newer types of industries are becoming important. These include electronic, vehicles, light engineering, oil and gas. This is due to competition with other countries in the former types of industry. In Angus, most of the industrial development is concentrated around only a few centres such as Montrose, Forfar and other towns along the coast. The observed slow growth of industrial development is attributed, to a certain extent, to the lack of suitable serviced sites and conflict with agricultural land. Tayside is one of the main agricultural producers in Scotland and as mentioned earlier, contains a high proportion of the country's top quality soil, especially in Angus. The agricultural sector is very highly developed, mechanized and commercialized. The main produce is barley and milk. Due to a high technology adopted in the agricultural sector, it provides only few employment opportunities compared to other sectors

2.1.2. Existing land use

The present distribution of rural/urban land uses, generally conforms to the Highlands versus lowlying areas.

The parishes of Glenisla, Lintrathen, Cortachy, Clova, Lehtnot and Navar, Lochlee and Edzelle represent the most underdeveloped parts of Angus. Here agriculture, forestry, nature reserves and recreation are the predominant uses.

The growing need for recreation has encouraged the growth of sporting activities; fishing and deer shooting being extremely profitable. Production of grains, vegetables and soft fruit are more feasible on the highly fertile lands of the Strathmore Valley and the South-East parishes. The towns of Pitlochry and Aberfeldy with populations of 2530 and 1550 respectively, display some potential for expansion of urban facilities in order to increase the services to highland areas.

This is to be contrasted with the older towns which once supported thriving industries, but are now in decline. Arbroath has lost prominence with the decline of shipbuilding. While there is a larger fish catch now, there are fewer boats meaning a fall in the level of employment in the fishing industry. In Forfar, industrial dereliction is evident, especially along the railway area.

2.2. Development Problems

2.2.1. General

The level of development of U.K. and Scotland in general can be regarded as being at a later stage of transformation from a dual economy to an industrial economy. Most of the problems therefore, are highly associated with the conflict between development transactions as a whole. The problem of world economic recession has only served to aggravate this situation. Based on information from the various planning documents, the problems of the Angus District

- a) Lack of employment opportunities due to decline in the industrial sector
- b) Inadequate water supply and sewerage facilities in the urban areas
- c) Landuse conflict between agriculture, housing and industry
- d) Lack of some physical and social rural infrastructure.

2.2.2. Landuse

The most important factor guiding the trend of landuses in the District is the necessity to provide new sources of income and to develop economic activity in the area. This objective means that a policy of socio-spatial expansion of the Tayside Region has to be pursued. The result of this is a great demand on the land area, particularly in respect of housing requirements

(1)

It has been estimated that the land needed to furnish additional housing, industrial and ancillary services up to the year 2001, will be approximately 2509.1 ha for the entire Tayside Region. Approximately 574 ha will be needed by the Angus District.

The urban area is expected to expand far beyond existing boundaries and into the periphery. The most rapid rate of growth will be evident in areas within closest proximity to development centres.

One of the consequences of this expansion is the loss of prime agricultural land to accommodate the demands of the urban uses. The land area formerly under agriculture and lost to other uses is shown in table 2.1.c. and Map

Table 2.2.a. TAKE UP OF AGRICULTURAL LAND FOR DEVELOPMENT BY NEW USE AND AGRICULTURAL QUALITY IN ANGUS 1972-79 (period)

Land Use	AGRICULTURAL CLASSIFICATION							TOTAL
	A+	A	B+	B	B-	C	D	
Public Housing	3.4	6.5	2.6	-	5.8			18.3
Private Housing	19.0	32.6	13.9	1.8	8.1	2.8		18.2
Major Roads	-	5.6	6.3					11.9
Schools, Prisons	2.5	1.1	-					3.6
Hospitals etc.			2.4					2.4
Industrial	1.6	11.3		20.2				33.1
Commercial								
	26.5	57.1	25.2	22.0	13.9	2.8		147.5

Source: Tayside Structure Plan - Report of Survey 1980.

1) Tayside - Potential for Development Vol.2
Scottish Development Department and University of Dundee, 1970

It is around the rural-urban fringe that the conflict of landuses becomes most critical. Montrose for example, which is witnessing rapid expansion arising from its establishment as a service base for oil rigs and petroleum exploration in the North Sea, is surrounded by extensive areas of A class agricultural land. Arbroath also has considerable development potential, based on the availability of serviced industrial sites, relief roads and improved sewerage facilities. However, development is severely constrained by the existence of prime agricultural land in its environs. Forfar has a similar problem.

2.3. Development Policies and Objectives

2.3.1. General

After reorganization of Local Government of Scotland in 1975, the policy planning was divided into two levels, namely regional and local level. The resulting policies are reflected in the various planning documents.

The development policy of the study area is reflected in the national policies which can be summarized as follows:

- a) to improve the industrial performance and productivity and to make sure the industry is given a high priority across the whole range of policies.
- b) to give priority to construction and improvement of roads which will assist industry and development in general, and to projects which offer clear environmental benefits.
- c) to conserve agricultural land which is classified as A+, A and B+ in quality and ensure that it is not taken for development unless a clear need has been identified which cannot be met on poorer land.

2.3.2. Landuse

The government policy of increasing productivity and output of the agricultural sector is reflected in (c) above. Agriculture still represents an important economic activity for the Region. Moreover in the context of Scotland's heritage and traditions, and for the preservation of the landscape qualities of the countryside, the maintenance of land in agriculture will be pursued.

However, it is recognised that at this time farming does not generate any high levels of employment and therefore is not an important development carrier in the area.

It is evident that a new range of job opportunities has to be provided for rural communities to promote a better quality of life for their inhabitants, to stem the declining population and for the improvement of levels of services and facilities in these communities. To achieve these objectives, industrial activity is being aggressively promoted in the district.

This means that the area will witness increasing changes to urban uses as viable economic projects become established. In the interest of the broader economic development of the area, the local councils can only attempt to guide the industrial developments.

In the absence of a defined land use policy, the Regional Development Plan is one tool for this purpose. It aims at the planning of co-ordinated sites for industries, other services and facilities around designated development centres.

In instances where developments proposed in local plans, are considered unjustified, a public enquiry and Inspector arbitrates based on evidence produced. The Department of Agriculture and Fisheries (DAF) represents the negotiating agent for the Agricultural sector. This Department (DAF) manages government land in the interest of protecting agricultural land. Through this medium the Government also offers incentives aimed at guiding the use of agricultural land and maintaining or altering production levels. Based on the development policies, the objectives can then be identified as follows:

- a) to generate employment opportunities through the diversification and promotion of the industrial sector.
- b) to improve the water supply and sewerage system
- c) to protect and enhance the environment by minimizing pollution
- d) to secure the provision of social infrastructure and physical amenities.

2.4. Development Impediments

In view of the existing problems, the promotion of industrial development is the alternative towards solving employment and economic growth problems. This development is however hindered to a certain extent by some development impediments, chief of which is the lack of suitable sites and hectarage for industrial development. This is mainly due to the conflict with agricultural landuse. The problem is further complicated by the lack of physical infrastructure. According to the strategies of economic growth, communities with low levels of facilities cannot feasibly accomodate projects and accompanying urban development. At the same time the increased concentration of urban services around growing communities will have the effect of further neglecting the more remote communities. This process, already evident in the Highland and Glen areas, results in further depopulation as social and economic services become increasingly costly to supply to smaller industrial units and at greater distances. These two major impediments will require real policy decisions to be taken to minimise the negative effects development might have in the Angus District.

CHAPTER III: THEORETICAL BACKGROUND AND METHODOLOGICAL DESIGN

3.1. General Introduction

Emerging from the "problem finding process" (de Man, Schaap 1980) in Ch. II and furnished with the development problems, the objectives and goals, it is evident that there exists a felt need for investigations into the sectoral and spatial pattern of development in the Angus District.

The conceptual "problem solving" path has been based on the goal of economic growth, along with the identification of zones showing the same socio-economic topography". This "solution finding" process was designed along the notion that "growth centres" induce further development and higher levels of prosperity over extensive geographical areas.

The survey steps and methodological path are illustrated below.

3.2. Theoretical background of the methodology

Johnson (1970, p. 166) remarked that "a developing country may never become developed unless its spatial structure, i.e. the functional role of settlements is re-organised. Successful industrialization therefore rests on revolutionizing and commercializing agriculture with the help of a hierarchy of multi-purpose central places". Further commercialization of agriculture in the Angus District may not be a wise attempt because sector has ceased to be a significant development carrier. Yet the need to promote a more dispersed industrial development calls for a carefully planned network of centres (RCPM p.62). Furthermore, regional development planning is assuming increasing importance as "central governments are felt to deal inadequately with local problems, resulting in an increasingly severe and politically dangerous competition by the regions for funds, goods and services from the central basket (Prof. J. Veenstra, 1975, p 11).

For accelerated economic growth deliberate regional policies are made towards concentrating economic growth within a few selected places or "growth centres". Such policies could be justified as follows:

- (I) that concentration enhances certain economies of scale - both external economies accruing to the firm and more tangible economies of scale in the building and control of the "growth centres"

(II) that spatial concentration is an efficient means of indirectly stimulating higher levels of development over much wider areas (the "spin-offs").

(III) that people tend to stay living somewhere if life in the place has its attractions for them - being income or employment, etc.

Despite the need to concentrate economic growth within urban centres the fact should not be lost sight of that most often these centres are not able to integrate and absorb additional populations.

Consequences like shortage of housing, water and other services, destruction of the environment, breakdown of the administration, congestion of communication systems, and a growing dissatisfaction among the population become major problems.

A further case for the concentration of growth was made by Berry (1969, p.288) who observed that growth impulses and economic development.... trickle down to smaller places and ultimately infuse dynamism into even the most traditionally bound rural peripheries"

In putting great emphasis on economic growth, an attempt is to be made as well to spread the spatial foci of development between urban centres (core regions) and rural centres. This leads to the need to identify growth centres in "central places" of homogeneous zones derived from characteristic physical, social, and economic variations, but mutually reinforcing patterns. For economic development implies a growing commercialization and specialization which in turn requires a better developed network of central places in the urban and rural scene.

However, it is interesting to note that James (1964) discussing the incompatibility of industrial vs. "trading cultures", demonstrated the frequent inability of small local manufacturers to dislodge established English suppliers to the new "growth pole" firms of central Scotland. This is due to "backwash" effects like relatively high strength of external economies in the U.K. centres, and the nature of the political system.

3.2.1. Towards homogeneity

Friedman (1966) pointed out that a number of areas with common prospects and problems of development emerged from the inter-action of the aforementioned processes (RCPM Ch. 3), thus forming "regions". Hence regionalization can be achieved in two ways:

- (I) A deductive or divisive way, in which the national territory is divided into smaller units on the basis of certain common characteristics or relationships,
- (II) An inductive or agglomerative way, in which smaller spatial units are grouped together on the basis of certain common characteristics or relationships. However, the method which is most often practised is the inductive method.

The use of the inductive method implies the necessity to use data aggregated at relatively low level, -preferably, sub-district (parish) level. Depending on the primary objective of the exercise, a whole range of variables can be constructed. Those include variables on:

- Agriculture and land use characteristics
- Socio-economic structure
- Demographic characteristics
- Transport infrastructure
- Social services and public utilities

The two techniques that have been applied in the Angus District will be discussed later (Ch. 3.3)

3.2.2. Towards hierarchization (system of central places) Christaller's model based on the marketing principle.

Christaller (1933), went into explaining the observed variation in the size and spacing of towns that perform the role of central places.

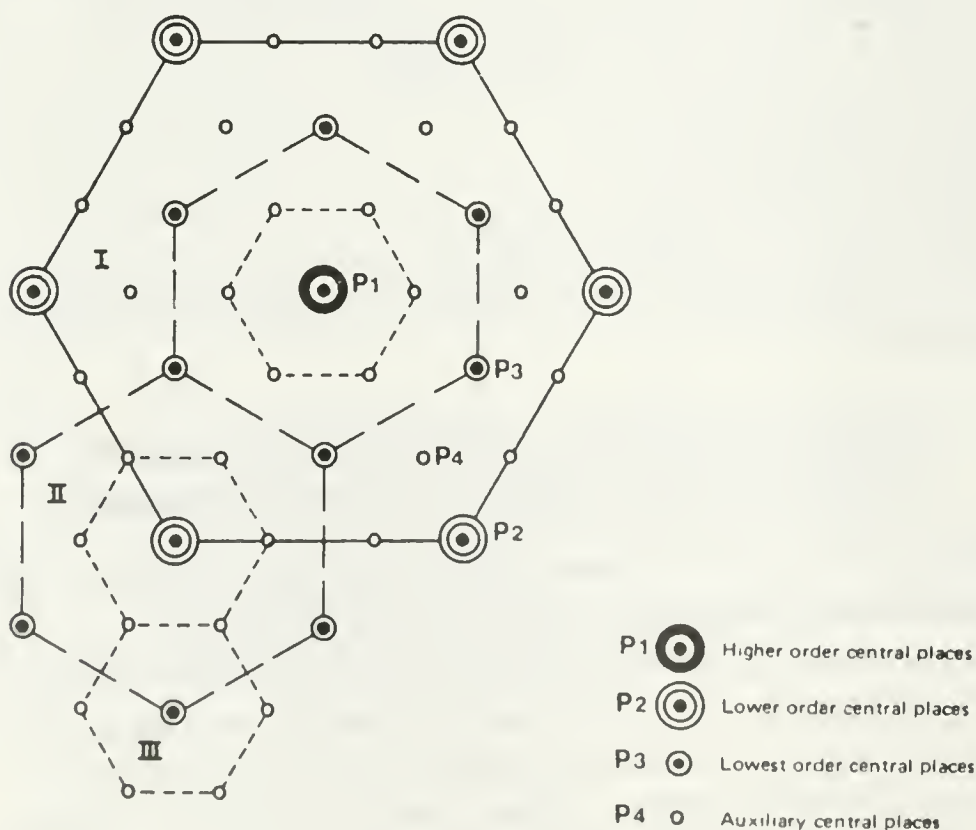
The theory of central places demonstrates that the threshold value and the range of a good, as well as the population density and the level of development (income) of a given area, determine the hierarchization and centrality of specific centres (RCPM p.53). The demand for central activities would also depend upon the distance (in our case 1,3,5,8,10 km) that persons had to travel to obtain the commodities, thus assuming that demand would fall off to zero with increasing distance from the central

place (Christaller pp 27-47). The service limit of each central activity is therefore described by the outer limit of the range of the commodity it provides. Central places which extend their influence over a large area were termed "central places of higher order" as against "central places of lower order" being central places with activities having less extensive influence.

Following the concept of the range of central commodities (i.e. the simultaneous spatial effect of factors like demand, income distribution, transportation facilities etc.), Christaller came out with a dispersion model of central places.

The model may be visualized in the following way:

Figure 3.2.1 Christaller's dispersion model of central places and their hierarchy, based on the marketing principle.



Source: Adapted from Christaller

It is believed that application of this marketing principle in practice eventually leads to a spatial pattern which maximizes the distribution of goods and services with the least number of central places, overlaps being wasteful. Galpin, also writing on the hierarchy of centres based on market areas, observed that artificial boundaries often obscure realities and may obstruct the emergence of truly rational patterns and greater regional efficiency. The solution, according to Galpin, should be a consciously planned action required to bring about the appropriate (hierarchical) structure in which central places occupy a coordination function (RCPM , pp 57-58).

A number of specific steps based on the survey of the actual situation, i.e. the "social" topography, economic patterns, spatial spread of development problems, and coming up with a future hierarchical plan aimed at tackling the problems are presented in the following four successive phases (RCPM pp 109-123):

I; The analysis of the present human and natural resource base of the "region" concerned . This involves information on the size of the present population and current settlement pattern; land use characteristics; present services and other amenities and the socio-economic structure. The suitable tools for obtaining this information include aerial photographs, office files and sample surveys, thus finally producing maps as a means of visualizing the results.

II: The determination of the present centrality of settlements .

Two methods are often applied, indexing and Guttman scaling, to arrive at the present situation in respect of the existing hierarchy of rural centres and their functions.

The technique of indexing is briefly discussed under Ch. 3.3.2.1.

III: The determination of the various hierarchical levels . The ranking of centres after the determination of their centrality is necessary in order to select those settlements that will act as "growth centres" in the plan and rank them accordingly. This could be achieved by showing the spread of the "centrality scores" with the peaks and troughs, indicating the necessary number of tiers in the hierarchy.

IV: The design of the rural centre plan .

The drawing up of the rural centre plan itself must of necessity take into account future developments with respect to:

- future national development programmes,
- trends in the population growth,
- the actual spatial behaviour of the majority of the population towards undergoing rapid changes, and
- specific elements in the natural resource base of the "region" that might have consequences for the future "regional" structure.

3.2.3. Assumptions underlying the methodology

The framework for homogeneity and hierarchization can be conceptualized from the following assumptions as concluded from the above discussion:

(a) That in a rural region, there exist "homogeneous development areas" emanating from a number of inter-related features of prosperity, distribution of facilities and services, and economic development (agriculture, industry etc.)- leading to the delineation of homogeneous zones.

(b) That a rural region could be sub-divided into major centres (:urban centres, rural intermediate, rural key centres and small rural centres) - leading to a classification of centres into a hierarchy, including the respective areas of influence.

3.3 Techniques/methodology applied in the Angus District

With reference to the actual Methodological Diagram (fig.3.4.1.) two techniques have been applied in coming up with the homogeneous zones. A subsequent analysis of hierarchy of centres contributed to selection of priority zones and pre-feasibility studies.

3.3.1. Homogeneity analysis

3.3.1.1. Factor analysis

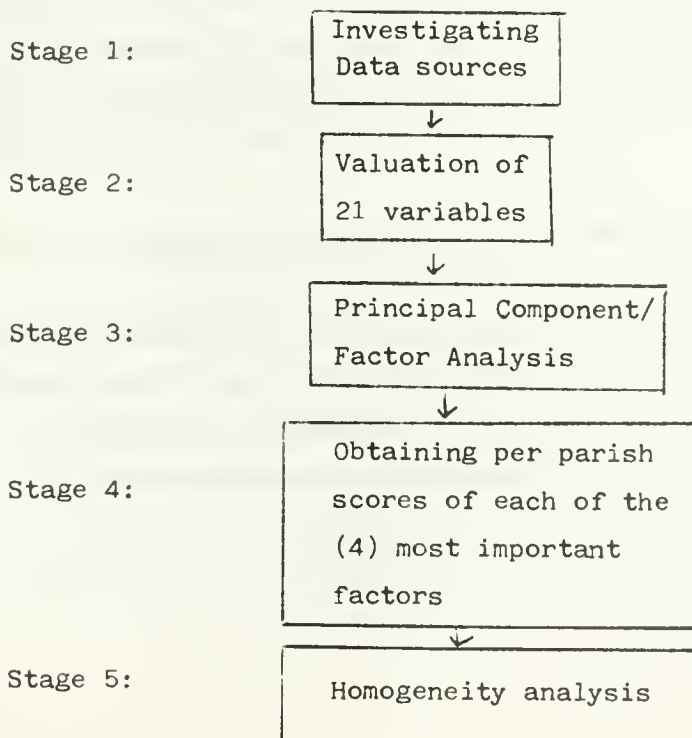
It is possible to use mathematical techniques in order to identify the most significant determinants or factors on the basis of a whole range of variables describing the various aspects of a region (or otherwise defined spatial unit). These factors may emerge as a combination of the variables; some variables may "contribute" to more than one factor for explaining for explaining regional features.

The technique of "factor analysis" is to compute on the basis of the existing correlation of each variable with every other variable, the most important (explaining) factors, and the way each variable contribute to them (the "factor loading"). To this end, the factors are extracted from the correlation matrix as "principal components" using the concept of so-called eigen-vectors. In this sense, the first and most important factor may be viewed as the best linear combination of variables, so that this particular combination accounts for more of the variance in the data as a whole than any other linear combination of variables. The second factor is the second best linear combination of variables after the effect of the first component is removed from the data. The technique of factor analysis is rather complicated, and the explanation or interpretation of the factors themselves is often far from easy.

Attempt was made to derive homogenous zones through factor analysis, parallel to another technique described in the next section. The stages

are illustrated in Figure 3.3.1. The actual selection and subsequent valuation of the variables is discussed in the various Sectoral Report A-K.

Figure 3.3.1. Data flow for factor analysis



For each parish (being the smallest spatial unit) data were collected for 21 variables covering 7 sectors. These data were then fed into the computer for deriving the most important principal components, or factors. This resulted in four significant factors accounting for appr. 60% of the overall variance in the data as a whole. According to the most dominant factor loadings by the variables, these factors were interpreted as:

- physical environment
- agricultural land utilization
- non-agricultural activities
- agricultural production

At this stage the parishes could be described adequately by the scores of these four factors and so the problem of homogeneity analysis was reduced from a 21 dimensional problem into a four dimensional problem. In the homogeneity analysis as well as in the subsequent selection of priority zones, per parish, a profile was used reflecting these four factors.

3.3.1.2. Scoring of variables for coloured maps

A much easier technique for homogeneity analysis is the use of coloured maps, each of them reflecting the rank per parish within a sector (e.g. agriculture). To this end, per parish each variable is given a score according to its value. At least within a sectoral group of variables, the range of the scores per variable is equal (e.g. 0 - 5). Per sectoral group the scores are added thus leading to an aggregate score per parish per sectoral group of variables from which its rank within the sector can be easily derived.

At this stage it should be possible to describe the parishes adequately by the ranks of two sectors only: agriculture and a composed rank of indirectly productive sectors (social/physical infrastructure and government administration). In the homogeneity analysis as well as in the subsequent selection of priority zones, per parish a profile was used reflecting these two sectoral factors.

The advantage of this technique is its simplicity and the possibility to include policy priorities in the scoring. A difficulty is to judge whether it is meaningful to aggregate all the variable scores within two sectoral groups of variables. Therefore it was decided to use this technique parallel to factor analysis, comparing the corresponding findings of both techniques at each stage.

3.3.2. HIERARCHIZATION OF CENTRES

In search of appropriate technique for deriving the centrality of places as well as their relative hierarchies, the index-method was applied in the delineation of the central places. The case for choosing this technique is that it can be easily adapted to local conditions, and is used in many studies.

3.3.2.1. INDEX-METHOD

The index-method is basically the collection of data on the nature and number of services and facilities present in each of the settlements in the "area" concerned.

Once data has been collected by different sectoral working-groups (health, education, water, communication etc.) it is possible to assign values to the service functions as found per settlement. The Totalling of those values per settlement results in the so-called CENTRALITY SCORE, which is actually an index for the level of functions in each settlement (RCPM, p112).

3.4. THE METHODOLOGY AS DESIGNED AND IMPLEMENTED

Three (3) methodological diagrammes were designed for the purpose of the study. One was set up prior to the fieldwork, the other evolved in the field and the third was designed during the data analysis back in ITC headquarters. The methodology designed during the fieldwork preparation phase Diagr.1.1.2 gave a broad outline of activities procedures, starting with the identification of development problems and culminating with the building up of alternative scenarios for development.

The second methodology diagramme Diagr.1.2.2. dealt with a more detailed description of techniques used (factor analysis and index method) to arrive at priority areas for development and funding, and the identification of pre-feasibility studies for the said areas.

However, based on further discussions on the results of factor analysis, the third diagramme (Fig.3.4.1) was designed to incorporate additional procedures in arriving at the final output.

The first diagrammes have already been discussed in Chapter 1. This section deals specifically with the third diagramme, or the methodology actually implemented.

It is to be emphasized from the beginning that the results of the study were geared towards the achievement of one specific development goal: economic growth.

3.4.1. METHODOLOGY AS IMPLEMENTED

Confronted with the actual situation in the field, the methodology as implemented included a series of steps geared towards the selection of priority areas and the identification of pre-feasibility studies in the said areas. Procedures for homogeneity analysis and the hierarchization of centres are distinguished but are fused together in arriving at the final output. A detailed discussion of such procedures follows (See Fig. 3.4.1).

Step 0: Definition, observation and calculation of sectoral variables.

Variables used for the homogeneity analysis basically measure the level of services and utilities, its adequacy or inadequacy and spatial distribution per parish. It should be noted, however, that the choice of these variables was made subjectively, being largely limited by data availability and time constraints. Due to the lack of data on the parish level for certain sectors (i.e. industry, housing), the variables selected for the homogeneity analysis include only the following (See Sectoral Reports A-K).

Agriculture and land use

- value of agricultural production/capita
- average farm size
- % employment in agriculture
- % change in agricultural employment
- % agricultural land
- maximum altitude
- water deficit and acc. temperature
- land use capability classification

Transportation

- road density (km/ha.)
- population/road km.
- bus stops per day

Water and sewerage

- potential water availability/capita
- sewerage quality

Health

- population per doctor
- population per hospital bed

Education

- average spare capacity in primary schools
- teacher/pupil ratio

Demography

- population density

Tourism

- maximum no. of hotel beds

Development finance

- total capital and recurrent costs/capita

As distinguished from the homogeneity analysis, variables used for the hierarchization of centres attempt to measure the centrality of places and differentiate among settlements in terms of functions, types of services and facilities, alongside population size and spatial distribution. The list of villages contained in the publication "Settlement and development in the countryside ^{*}" was used as the reference point from which the hierarchy of rural centres was to be determined. However, the results of the hierarchy of rural centres may be limited by the absence of data for some of the villages.

For the hierarchy of urban centres, the six (6) major towns of Arbroath, Forfar, Montrose, Kirriemuir, Brechin and Carnoustie were chosen in the study area. Since data for the housing and industry sectors were available only for the 6 towns, such sectors contributed only in the determination of the hierarchy of urban centres.

The variables used for the hierarchization of rural centres are as follows (See Sectoral Reports A-K).

Education

- Presence of a primary school

Tourism

- Types of tourist accommodations

For the hierarchy of urban centres, the variables used are the following:
(See Sectoral Reports A-K)

Demography and housing

- Population density
- % change in dwelling units/% change in population (1977-1980)

Industry

- % employed in town to total employed in district
- % employed per economic activity

Transport and communication

- Type of roads

^{*} Settlement and development in the Countryside Angus District
Planning Department, July 1976 pp 33-37

Water and sewerage

- Potential water availability/Capita
- Type of sewerage system
- Type of sewage treatment

Education

- Type of schools

Health

- Type of health facilities
- Type of health manpower

Tourism

- No. of hotel beds

For a detailed explanation of these variables, please refer to the Sectoral Reports A-K.

Step 1: Factor analysis and scoring of variables for homogeneity analysis and hierarchization of centres.

With the variables defined and calculated, the application of two (2) techniques, namely factor analysis and index method for the determination of homogeneous zones followed.

For indexing, each variable is classified and assigned a score value of one (1) to five(5) showing parishes having a similar characteristic with respect to a certain variable. The scores per parish for each variable are shown in 21 coloured maps, a colour representing a certain score.

For factor analysis, the variables were not scored, but, instead, absolute figures were taken and fed to the computer to determine clusters of variables that were correlated.

For the hierarchization of centres, the index method was likewise applied. Similarly, a score of 1 to 5 was assigned to functions (variables), existing in the villages, but weights were given within the said functions. To illustrate, in a certain function like type of roads, more weight was given to the presence of an A road than to a B road or other access roads. However, no weighting was given yet among variables, so that each parish had equal chances of scoring 1 to 5 for each variable.

Step 2: Combining coloured maps for homogeneity analysis, and ranking of urban and rural settlements.

To combine or reduce the number of coloured maps, certain variables were arbitrarily or subjectively grouped together to form one (1) sector. Thus, health, education and demography sectors were combined to form the social sector and the scores for each of these sectors were aggregated and divided by the number of variables to get the composite score for the social sector. Likewise water and sewerage, transport and communication were combined into the physical sector and their respective scores averaged to arrive at 1 score for the physical sector. The variables for agriculture and development administration and finance were not combined with any other sector. The results were again presented in coloured maps, and compared with those of the computerized factor analysis with the most significant factors, showing clusters of positively or negatively correlated variables. It may happen that some of the variables combined in the index method may be found not to be correlated by factor analysis.

For the ranking of the urban and rural settlements, each settlement was given one composite centrality score by aggregating all the scores for each of the variables. Assigning of weights among the different variables was not yet applied at this stage. Based on the scores obtained, each settlement was ranked accordingly to derive a preliminary index of the functional level of each. The ranking of urban and rural settlements was executed by classifying the scores into class intervals, and comparing them with established criteria on the size and nature of functions for each type of centre (Fig.3.4.2.).

Such criteria were arrived at through a review of existing literature on rural centre planning, an examination of available quantitative data and upon consultation with local authorities. See Chapter 4.

Step 3: Selection of homogeneous zones and the hierarchy of centres

Taking into consideration existing policies and problems, a weighting system to show the relative importance of variables was introduced. Thus, the variables for certain sectors considered as bottlenecks in terms of economic growth, and on which existing policies put more emphasis, were given more weight than others which were relatively less important. Scores for the latter were therefore reduced to half or fifty percent (50%) while the scores for the more important sectors were maintained. For the homogeneity analysis, water and sewerage, transport and communication, development administration and finance were the sectors given more weight than others. For the hierarchy of urban centres, industry, water and sewerage were considered to be relatively more important than other sectors; while for the hierarchy of rural centres, scores for water and sewerage, transport and communication were retained.

The physical /social, development administration and finance sectors were further grouped together to form the indirectly productive sector, and agriculture represented the productive sector. The individual scores for the sectors making up the indirectly productive sector were averaged after applying the weights among them, to get one composite score.

The 2 composite scores per parish were classified and ranked into three (3) categories. The composite scores for the directly and indirectly productive sectors were again depicted into two (2) coloured maps indicating the homogenous zones in terms of the 2 sectors. The scores per parish for both the directly and indirectly productive sectors were then added together to arrive finally at homogeneous zones.

TABLE 3.4.1. CRITERIA FOR RANKING OF CENTRES

RANK	TYPE, OF CENTRE	LEVEL	SCORE	POP. IN CENTRE	POP. IN SERVICE AREA	RADIUS OF INFLUENCE
I	Major urban centre (towns)	Urban parish	34-28	2,500 (minimum)	10,000 (minimum)	10 km
II	Minor urban centre (towns)	Urban parish	27-20	1,500 (minimum)	7,000 (minimum)	8 km
III	Rural key centres (village)	Rural parish	31-25	100 (minimum)	200 (minimum)	5 km
IV	Intermediate (secondary village)	Rural parish	24-10	25 (minimum)	100 (minimum)	3 km
V	Tertiary centre (village)	Rural parish	< 10	10 (minimum)	50 (minimum)	1 km

III-16

Fig. 3.3.2.

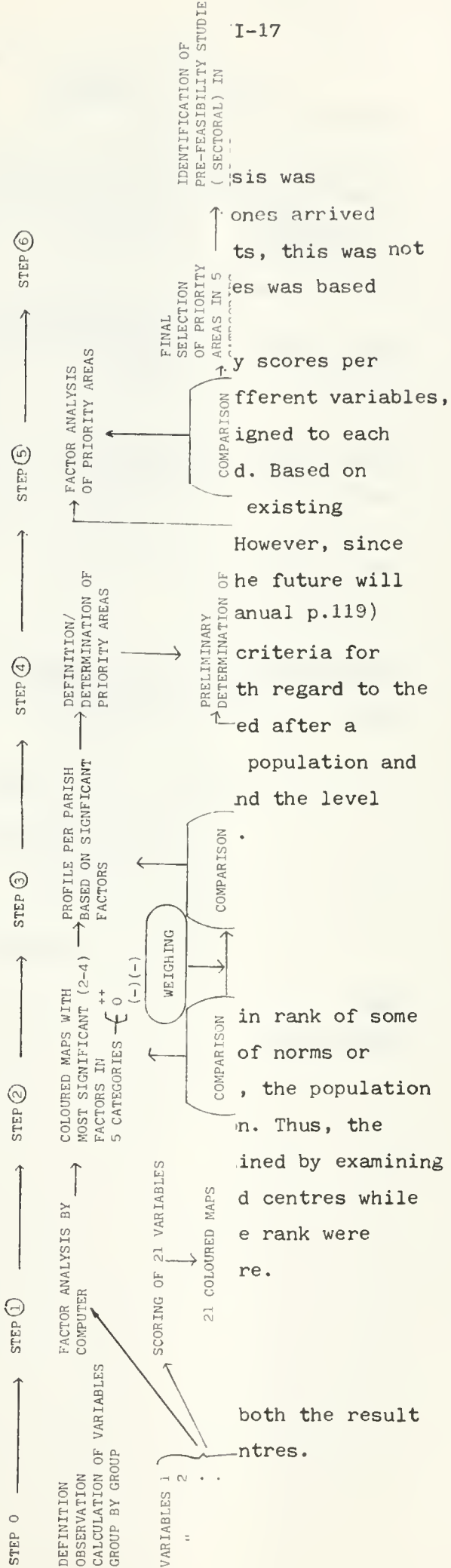


TABLE 3.4.1. CRITERIA FOR RANKING OF CENTRES

RANK	TYPE OF CENTRE	LEVEL	SCORE	POP. IN CENTRE	POP. IN SERVICE AREA	RADIUS OF INFLUENCE	SERVICES	PUBLIC UTILITIES	TYPE OF ROADS	ADDITIONAL CONSIDERATIONS
I	Major urban centre (towns)	Urban parish	34-28	2,500 (minimum)	10,000 (minimum)	10 km	Hospital w/100 beds or more, clinic, secondary and primary school, tourist accommodations, post office	Adequate water supply, partly separated sewerage system, full sewage treatment, very good bus services	A,B,C roads and railroad	Good quality agricultural land, very high level of economic activity (manufacturing, construction etc.)
II	Minor urban centre (towns)	Urban parish	27-20	1,500 (minimum)	7,000 (minimum)	8 km	Hospitals w/less than 100 beds, clinic, secondary and primary schools, tourist accommodations, post office	Adequate water supply, partly separated sewerage system, Full or partial sewage system. Very good bus services	A,B,C roads	Good quality agricultural land, moderately high level of economic activity
III	Rural key centres (village)	Rural parish	31-25	100 (minimum)	200 (minimum)	5 km	Rural health clinic, primary school, post office, tourist accommodation	Adequate water supply, combined or partly separated sewerage system, full or partial sewage treatment, good bus service	A and B roads	Good quality agricultural land
IV	Inter-mediate (secondary village)	Rural parish	24-10	25 (minimum)	100 (minimum)	3 km	Primary school, post office	Marginally adequate water supply, combined sewerage system. Partial sewage treatment, fair bus service	B road	Good to marginal agricultural land
V	Tertiary centre (village)	Rural parish	< 10	10 (minimum)	50 (minimum)	1 km	Primary school, tourist sites	Poor water supply, poor bus service	C road	Good and poor agricultural land

Fig. 3.3.2.

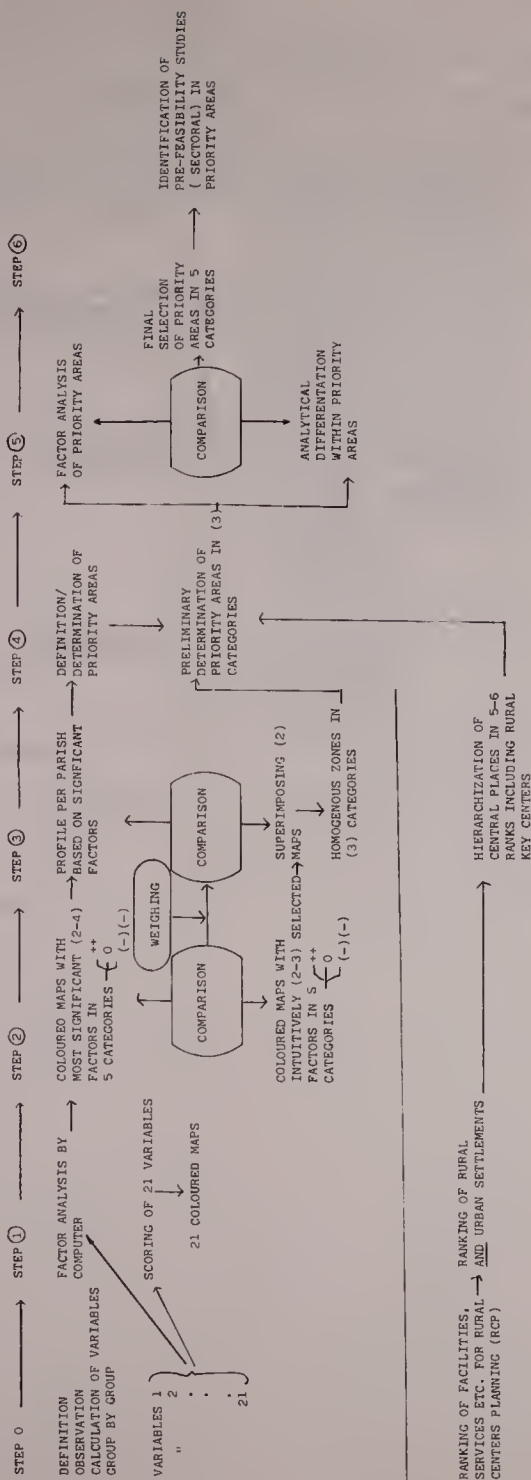


FIG. METHODOLOGY AS IMPLEMENTED

A profile per parish based on the results of factor analysis was supposed to be set up, and compared with the homogenous zones arrived at using the index method. However, due to time constraints, this was not the case and thus, the final selection of homogeneous zones was based solely on the index method.

For the hierarchization of central places, the preliminary scores per village derived without applying the weights among the different variables, were reconsidered. Applying at this stage the weights assigned to each variable, the scores were again totalled and re-classified. Based on these scores and the criteria for ranking of centres, the existing hierarchy of urban and rural settlements was determined. However, since "planning has a prospective goal, it will be clear that the future will have to be taken into account" (Rural Centres Planning Manual p.119) Therefore, based on the present centre plan and certain criteria for ranking of potential centres, the hierarchy of centres with regard to the future situation was determined. Such hierarchy was derived after a close examination of each existing centre in terms of its population and service area, its distance to a centre of the same rank and the level of services and facilities existing therein (Table 3.4.3).

Since overlapping of functions is wasteful, the lowering in rank of some centres was considered (Table 3.4.4.. Due to the absence of norms or standards on threshold levels for services and facilities, the population and distance criteria were leased on the present situation. Thus, the population in the centre and its service area were determined by examining the magnitude and spread of the population of the selected centres while the criteria regarding the distance to centres of the same rank were based on the established radius of influence of each centre.

Step 4: Preliminary selection of priority areas

The preliminary selection of priority areas incorporated both the result of the homogeneity analysis and the hierarchization of centres.

Table 3.4.2. CRITERIA FOR RANKING OF POTENTIAL CENTRES

POTENTIAL RANK OF CENTRES	POPULATION IN SERVICE AREAS	POPULATION IN CENTRE	DISTANCE TO CENTRE OF SAME RANK
Major urban centre	(All existing major urban centres)		
Minor urban centre	(All existing minor urban centres)		
Key centre	(All existing key centres except Charleston)		
	> 200	> 100	> 5 km
Intermediate centre	(All existing intermediate centres with the exception of those overlapping with centers of the same rank and with a relatively low level of services/facilities)		
	> 100	> 50	≥ 3 km
	> 100	< 50	> 3 km
	-	> 50	> 3 km
	< 100	< 50	≥ 4 km
Small settlements	(All remaining villages)		

TABLE 3.4.3.. CRITERIA FOR LOWERING IN RANK OF EXISTING CENTRES

PRESENT RANK OF CENTRES	POPULATION IN SERVICE AREA	POPULATION IN CENTRE	DISTANCE TO CENTRES OF SAME RANK
Major urban centre	(none)		
Minor urban centre	(none)		
Key centre	-	< 100	1 km
Intermediate centre	(All existing intermediate centres which overlap with centres of the same rank and with a relatively lower level of services and facilities		
	< 100	< 50	< 3 km
Small settlement	(none)		

Certain considerations were led, firstly, the determination of priority areas for urban .vs. rural development. Next, priority areas were taken from the middle category (rank II) of homogenous zones for the reason that this category, theoretically, is the most economically feasible for development since backward areas (Rank III) will have a long "gestation period" before development inputs could become evident with further development. Inputs to highly developed areas will produce a relatively smaller impact than if development efforts are focused on the middle category II areas. Further, priority areas were also taken from rural parishes with an existing or potential key centre because of their function as radiation points of employment and income generation to the rural areas.

With this line of reasoning, the selection of priority areas for rural development was therefore centred on rural parishes with an existing and/or potential key centre, and parishes with a rank of I/II: both for the directly and indirectly productive sectors. The priorities for urban development were focused on the 6 major towns since these areas already have higher levels of economic activity and as development inputs are still needed to sustain economic growth.

Step 5: Final Selection of Priority Areas in Angus District.

A final examination of priority areas necessitated further differentiation within these areas. As such, the preliminary use of priorities was subjected to factor analysis, while a simultaneous analysis oriented towards policy making was executed. In the light of existing policies, priorities for urban development were further broken down into first and second priority after giving primary consideration to the areas' potentials for industrial development. Areas identified to perform more of a dormitory function or to play a secondary role in relation to other urban towns were to be given second priority. The priorities for rural development were likewise differentiated into first or second priority. To be given first priority were areas with an adequate water supply, traversed by an A road and/or with a relatively high level of recurrent expenditure, the reasons, apart from policy considerations being that the adequacy of water supply is a prerequisite for further industrial and residential development, that the presence of an A road makes an area

open to development while a relatively high level of recurrent govt. expenditure was assumed to indicate an area's capacity to carry out development activities.

The results from such an analysis were compared and reconciled with those of factor analysis with the most significant factors in order to come up with the final list of priority areas.

Step 6: Identification of pre-feasibility studies in priority areas.

The identification of pre-feasibility studies in priority areas involved a synthesis of the various sectoral recommendations. Thus, a comprehensive view of each priority area in terms of its development potentials and constraints per sector was taken, giving indications of areas for further investigation. The development carriers for each of the priority areas were highlighted and problems restraining economic growth, pointed out.

CHAPTER IV.THE METHODOLOGICAL RESULTS IN THE ANGUS DISTRICT

This chapter deals with the results of the study based on the methodology previously discussed. The outcomes of the homogeneity analysis and the hierachization of central places are presented and thus, homogeneous zones are delineated, the functions of each settlement defined, and priority areas identified. The reasoning behind certain results are explained for a better understanding of the findings.

4.1. Decisions on homogeneous zones

4.1.1. Results based on index method

Assuming that population density and service levels are positively related to economic development, the results of the homogeneity analysis using the index method delineated parishes at both extremes of development. Ranked into three (3) categories, with rank I indicating parishes with a higher level of services and rank III at the other end. The composite results, indicated in map A. clearly discriminated the glens from the lowland areas, the underdeveloped from the developed areas. The highlands consisting of the parishes of Glenisla, Linthraton, Cortachy and Clova, Lethnot and Navar, Loch Lee and other nearby contiguous parishes formed one large homogenous zone where services and facilities are few. An exception is Edzell which although it has poor quality agricultural land has a higher level of services and facilities which are utilized not only by the parish itself but by the rest of the highlands as well.

On the other hand, the parishes near the coast, i.e. Montrose, Arbroath, Inverkeilor etc. , made up another homogenous zone where services and facilities are relatively high. In between are the parishes mostly on the Southern part of the district, the most notable of which are Forfar and Kirriemuir (See Appendix 4.A. for detailed listing of parishes with a specific rank). Furthermore it can be observed that the parishes' ranks decrease as one moves away from the green zone (rank I) which may well indicate the "spread effects", developed areas are exerting on other parishes in close proximity to them.

Table 4.1.1. shows that all in all, the composite ranking resulted in eight (8) parishes with a rank I, 18 with a rank II and 17 with a rank III or percentage-wise, 19%, 42% and 39% respectively. In the indirectly productive sector alone (Refer to map B), 23 or more than one half of the 43 parishes fell under the middle category while only 11 stood out as rank I. Homogeneous zones with regard to the productive sector were quite evident which again discriminated between the highlands and the lowlands (Refer to map C)

Only 11 parishes, however, had the same rank both for the indirectly and directly productive sectors as shown in table 4.1.2.

Table 4.1.1. NUMBER OF PARISHES WITH A SPECIFIC RANK PER SECTOR

Rank	Productive sector		Indirectly prod.sector		Composite rank	
	Number of parishes	%	Number of parishes	(%)*	Number of parishes	(%)*
I	20	47	11	26	8	19
II	10	23	23	53	18	42
III	13	30	9	21	17	39
TOTAL	43	100	43	100	43	100

* Percent to the total number of parishes

Table 4.1.2. NUMBER OF PARISHES WITH A SPECIFIC RANK OF INDIRECTLY AND DIRECTLY PRODUCTIVE SECTORS IN ANGUS DISTRICT.

INDIRECTLY PRODUCTIVE	DIRECTLY PRODUCTIVE			TOTAL
	I	II	III	
I	4	4	3	11
II	16	3	4	23
III	1	4	4	9
TOTAL	21	11	11	43

Analysis per planning area indicated that the parishes within the Arbroath - Carnoustie area are apparently better off than others in Forfar - Kirriemuir and Montrose - Brechin planning areas. No parish in Arbroath - Carnoustie was given a rank III as compared to 13 parishes in Forfar-Kirriemuir and 4 in Montrose-Brechin (Table 4.13). This may be attributed to the presence of the glens in these 2 planning areas where the level of services and facilities is low.

Table 4.1.3. Number of parishes with a specific rank per sector,
per planning area in Angus District

Planning area	Indirectly productive				Directly productive				Composite rank			
	rank I	II	III	Total	Rank I	II	III	Total	I	II	III	Total
Arbroath-Carnoustie	2	7	1	10	8	2	-	10	3	7	-	10
Montrose-Brechin	5	6	2	13	8	1	4	13	5	4	4	13
Forfar-Kirriemuir	4	9	7	20	4	7	9	20	-	7	13	20
Total	11	22	10	43	20	10	13	43	8	17	18	43

4.1.2. Factor analysis results

The results of factor analysis revealed 4 significant factors towards homogeneity analysis (See Appendix 4b for details). The correlated variables influencing the values of these factors are as follows: *)

*) Notice that not all variables listed do have direct causal relationships; this may clarify the somewhat unique listing of the correlated variables.

Factor 1 : "physical environment"

- maximum altitude +
- water deficit +
- land capability +
- population density -
- road density -
- bus stops/day -
- population/hospital beds +
- maximum no. of hotel beds -

Factor 2: "agricultural land utilization"

- average farm size -
- % agricultural land -

Factor 3 : "non-agricultural activities"

- % change in agricultural employment +
- total capital cost/capita +

Factor 4 : "agricultural production"

- value agricultural production/capita +
- population/road density -

Due to time constraints, however, it was not possible to make a thorough comparison between the findings of factor analysis and of the index method. Keeping in mind the educational objectives of the fieldwork as well, it was therefore decided to adopt the results of the index method in the delineation of homogenous zones, as presented in par. 4.1.1.

4.2. Decisions on hierarchization

5 tiered hierarchical centre plan in Angus District.

There were two (2) hierarchical centre plans developed for the Angus District - one for the existing situation and the other for the future. A five-tiered hierarchy of centres, differentiating between urban and rural functions was pursued and resulted in the identification of major urban centres, minor urban centres, rural key centres, intermediate centres and small settlements.

While it is difficult to draw a clear line as to what the function of each type of centre in the hierarchy is or should be, some general guidelines can be formulated indicating roughly a profile of each centre. Such profile can be gleaned from the table on the criteria for the ranking of centres (Table 3.1.1.) which was included in the previous chapter. In addition, a brief description of each centre in terms of its functions follows here:

- A major urban centre is the highest centre in the hierarchy, spreading its influence over a number of parishes. It is an important centre of population, commerce and employment and is often the core of further industrial development;
- A minor urban centre complements a major urban centre, playing a secondary role to some of its functions. However, the function it performs is primarily dormitory and thus development efforts are geared towards further housing development. Alternatively, it can likewise serve as a recreation/tourism centre;
- A rural key centre functions as a radiation point of local employment to the rural areas and is suitable for a considerable industrial growth. The establishment of agriculturally related as well as small non-agricultural industries is encouraged to generate local employment. It likewise performs a dormitory function for workers to live outside the urban centres.
- An intermediate centre "Performs more than an agricultural function but is suitable only for limited or infill development" (Settlements and Development in the countryside-Angus District p. 18). Encouragement is given to agriculturally related industries, but only in highly exceptional cases to non-agricultural industries;
- A small settlement has very little or no basic facilities at all and thus, is dependent on higher order centres for social and economic services. It is suitable for very limited development from tourism and recreational projects. This is especially true for villages in the glens.

4.2.1. Existing hierarchy of centres

Based on the existing situation ,the hierarchy of centres in the Angus district consisted of 3 major urban centres, 3 minor urban centres, 12 rural key centres, 35 intermediate centres and 27 small settlements as shown below : Table 4.2.1.

Table 4.2.1. Existing hierarchy of centres per parish

Parish	Major Urban Centre	Minor Urban Centre	Rural Key Centre	Intermediate Centre	Small Settlement
Monikie	Arbroath	Carnoustie	Monikie	New Biggin Craigton	Denfind
Panbride			Muirdrum	East Haven Pan Bride Arbirlot	
Arbirlot					
Carmyllie				Carmyllie Redford	Greystone
Kirkden			Friockheim		
Inverkeilor			Inverkeilor		Leysmill
Lunan					Lunan
Kinnell				Kinnel	Braeheap of Lunan
Arbroath					
Barry					
Maryton				Maryton Barnhead	
Craig				Ferryden	Kirkton of Craig Craig
Dun				Bridge of Dun	Tayock
Farnell				Farnell	
Logie Pert			Craigo		Logie Pert

Parish	Major Urban Centre	Minor Urban Centre	Rural Key Centre	Intermediate Centre	Small Settlements	
Stracathro	Montrose	Brechtin	Edzell	Stracathro	Inchbare	
Edzell				Mains of Careston	Tigerton Balhak Crescent Kirkton of Menmuir	
Careston						
Menmuir				Bridgend of Lethnol		
Lethnol and Navar						
Loch Lee				Tarfside		
Inverarity				Inverarity Gateside		
Montrose			Glamis Charleston Newtyle	Padanaram	Kirkinch Balkeerie Kinnettles	
Brechtin						
Glamis						
Newtyle						
Eassie and Nevay			Aberlemno	Eassie Muir	Burnside Oathlaw	
Kinnettles				Douglastown		
Airlie				Craigton of Airlie Airlie		
Guthrie				Guthrie		
Rescobie				Pitkenned Tannadice	Mevius Milton of Ogilvie	
Oathlaw						
Aberlemno						
Tannadice						
Cortachy and Clova				Clova Dykehad	Cortachy Inchmill Glenprosen	
Kingoldrum				Kingoldrum		
Linthraten						
					Bridgend of Linthraten Kilry	

Parish	Major Urban Centre	Minor Urban Centre	Rural Key Centre	Intermediate Centre	Small Settlement
Glenisla					Kirkton of Glenisla
Fern				Fern	Folda
Ruthven				Ruthven	
Dunnichen			Letham	Craichie Dunnichen Bowrlefauld	
Forfar	Forfar				
Kirriemuir		Kirriemuir			
TOTAL	3	3	12	35	27

Urban centres

The 3 major towns of Arbroath, Montrose and Forfar represented the highest order centres in the existing hierarchy ;The high level of economic activity and employment in the said towns was clearly discriminated from that of the towns of Brechin,Carnoustie and Kirriemuir which were classified as minor urban centres.

Rural centres

On the rural scene, Friockheim, the parish centre of Kirkden stood out among the rural key centres with its wide range of services and facilities and large population size. The glens had their own rural key centre in Edzell, in addition to Tarfside and Clova which were designated as intermediate centres. For the location and rank of all existing centres and their respective radii of influence, refer to Map D.The detailed profile of each settlement in terms of the variables considered are given in appendix Table 4.C and 4.D.

4.2.2. Future centre plan

The hierarchy of centres for the future situation showed only a slight change from the existing hierarchization. No potential urban centre was identified because none of the villages came close to the features of urban centres with regard to economic activities, population size and the nature of services and facilities. Ten (10) intermediate centres and one key centre (Charleston), however, were lowered in rank due primarily to a small population and service area and a relatively lower level of services and facilities compared to other overlapping centres. On the other hand, Ferryden (Craig) was promoted to a rural key centre mainly because of its exceptionally large population size in relation to other existing intermediate centres. The intermediate centres of Tarfside and Clova were retained due to their large considerable distance from another centre (See map E) and Table 4.2.2.

Table 4.2.2. Future hierarchy of centres per parish

Parish	Major Urban Centre	Minor Urban Centre	Rural Key Centre	Intermediate Centre	Small settlement
Monikie			Monikie	New Bigging	Craigton* Denfind
Panbride			Muir drum	East Haven	Panbride*
Arbirlot			Arbirlot		
Carmyllie				Carmyllie	Redford* Greystone
Kirkden			Friockheim		
Inverkeilor			Inverkeilor	Leysmill**	
Lunan					Lunan Braehead of Lunan
Kinnell				Kinnell	
Arbroath	Arbroath				
Barry		Carnoustie			
Maryton				Maryton	Barnhead*

Parish	Major Urban Centre	Minor Urban Centre	Rural Key Centre	Intermediate Centre	Small Settlement
Craig	Montrose	Brechtin	Ferryden **		Kirkton of Craig Craig
Dun					Bridge of Dun * Tayock
Farnell				Farnell	
Logie Pert			Craig		Logie Pert
Stracathro				Stracathro	Inchbare
Fdzell			Edzell		
Careston				Mains of Careston	
Menmuir					Banhan Crescent Tigerton Kirkton of Menmuir
Lethnol and Navar				Bridgend of Lethnol	
Loch Lee				Tarfside	
Inverarity				Inverarity	Gateside *
Montrose					
Brechtin					
Glamis			Glamis	Charleston * Padanaram	
Newtyle			Newtyle		
Eassie and Neway				Eassie Muir	Kirkinch Balkeerie
Kinnettles				Douglastown	Kinnettles
Airlie				Craigton of Airlie	
Guthrie				Guthrie	
Rescobie					Burnside
Oathlaw				Bogindollo	Oathlaw
Aberlemno			Aberlemno	Pitkenney	
Tannadice				Tannadice	Menius Milton of Ogilvie
Cortachy and Clova				Clova Dykehead	Cortachy Inchmill Glenprosen
Kingoldrum				Kingoldrum	
Linthraten					Bridgend of Linthraten Kilry

Parish	Major Urban Centre	Minor Urban Centre	Rural Key Centre	Intermediate Centre	Small settlement
Glenisla					Kirkton of Glenisla Folda
Fern Ruthven Dunnichen			Letham	Fern Ruthven Craichie	Bowriefauld * Dunnichen *
Forfar Kirriemuir	Forfar	Kirriemuir			
TOTAL	3	3	12	27	35

* Lowered in rank

** Promoted in rank

Table 4.2.3. shows the breakdown of centres per planning area. The centres were more or less equally distributed among the planning areas relative to their size. Although the situation in Arbroath-Carnoustie appeared to be a little better than in Forfar-Kirriemuir and Montrose-Brechin, the differences were not too outstanding. The planning areas had more or less equal percentages of each type of centre within them with a difference only of about 10 percent in most of the cases.

Table 4.2.3. Number of centres per planning area (existing and future situation) in Angus District.

Planning area	Major Urban Centre		Minor urban Centre		Rural key Centre		Intermediate Centre		Small settlement		TOTAL	
	No.	Percent*	No.	Percent*	No.	Percent*	No.	Percent*	No.	Percent*	No.	Percent*
Arbroath-Carnoustie	1 1	5% 5%	1 1	5% 5%	5 5	26% 26%	7 5	38% 26%	5 7	26% 38%	23 23	100% 100%
Montrose-Brechin	1 1	4 4%	1 1	4% 4%	2 3	9% 14%	11 7	48% 30%	8 11	35% 48%	19 19	100% 100%
Forfar-Kirriemuir	1 1	3 3%	1 1	3% 3%	5 4	13% 11%	17 15	44% 39%	14 17	37% 45%	38 38	100% 100%
TOTAL	3 3	4 4%	3 3	4% 4%	12 12	15% 15%	35 27	43% 34%	27 35	34% 43%	80 80	100% 100%

* Percentage within planning area

present	future
---------	--------

4.3. Selection of priority areas

Based on the selection criteria discussed in the previous chapter, which incorporated the results of the homogeneity analysis and hierarchization, twenty (20) priority areas for development were chosen - six (6) for urban development and fourteen (14) for rural development (See Map F). These were further differentiated into first and second priority as follows:

Priority areas for urban development

1st priority : Arbroath

Montrose

Forfar

2nd priority : Brechin

Carnoustie

Kirriemuir

Priority areas for rural development

1st priority : Kirkden

Inverkeilor

Logie Pert

Edzell

Glamis

Dunnichen

Craig

Newtyle

2nd priority : Panbride

Aberlemno

Arbirlot

Monikie

Carmyllie

Inverarity

4.3.1. Priority areas for Urban Development

The selection of Arbroath, Montrose and Forfar as first priority for urban development, had been guided to a large extent by existing policies and plans which pointed to these areas as having potentials for employment and industrial development. Additional considerations included the existence of a higher spare capacity in primary schools to absorb further housing development, which is in turn stimulated by growth of employment. The recurrent Government industrial expenditures of these areas were also higher than those of Brechin, Carnoustie and Kirriemuir.

4.3.2. Priorities for Rural Development

The differentiation within priority areas for rural development taking into consideration the adequacy of water supply, the presence of the best access road (A road), and/or high recurrent expenditure, resulted in the identification of eight (8) parishes as top priority for rural development. In addition, the score of each parish in the hierarchization was likewise considered to get an overall picture of the parishes regarding other services and facilities. The resulting profiles per parish are as follows in Table 4.3.1.

Table 4.3.1. Profiles per parish based on certain selected variables

Parish	Score		Potential water availability		Presence of an A road		Recurrent Expenditure	
	≥ 26,5	< 26,5	Good	Bad	With	without	High	Low
Kirkden	V		V		V		V	
Inverkeilor	V		V		V		V	
Logie Pert	V		V		V			V
Edzell	V		V			V	V	
Glamis	V		V		V		V	
Dunnichen	V		V			V	V	
Craig		V	V			V	V	
Newtyle		V	V		V		V	
Panbride		V		V	V		V	
Aberlemno		V	V			V		V
Monikie		V	V			V		V
Carmyllie		V	V		V			V
Inverarity		V		V		V		V
Arbirlot	V		V			V		V

The above formed the basis for the selection of the parishes to be given first priority for rural development, thus, the first 8 in the list were chosen as top priority because of their favourable profiles with respect to the selection criteria. Although Newtyle scored less than 26.5, it was included in the list because it fared well in the other factors. It is also the only rural parish with a secondary school. Craig was likewise included in the list because aside from having a relatively high potential water availability and recurrent expenditure, its big parish centre, Ferryden, has a high potential of becoming a dormitory town for Montrose.

The results of factor analysis appeared to support this selection. Four (4) significant factors with their positively and negatively correlated variables were identified; see paragraph 4.1.2.

Factor I

- % Agricultural land -
- Maximum altitude +
- Land Use capability +
- Road density (km/ha) -
- Maximum no. of hotel beds +

Factor II

- % employed in agriculture +
- Population density -
- Population/Road km -

Factor III

- % Change agriculture employed +
- Recurrent and capital cost/capita +

Factor IV

- Potential water availability/capita -

Note that the variables considered in the previous selection also appeared in the factor analysis: Potential water availability/capita in factor IV, capital and recurrent expenditure/capita in factor III and road density in factor I (assuming that this variable reflects the presence of an A road). A similar profile based on these results was therefore devised and along the line of the selection criteria followed previously, rural parishes to be given first priority for development were then those with a high value for factor II, factor IV, factor I and/or factor III.

Table 4.3.2. Profile per parish based on four (4) significant factors

Parish	Factor I		Factor II		Factor III		Factor IV	
	High	Low	High	Low	High	Low	High	Low
Kirkden	V		V			V	V	
Inverkeilor	V			V		V	V	
Logie Pert	V		V		V		V	
Edzell		V	V		V			V
Glamis		V		V	V		V	
Dunnichen	V		V			V	V	
Craig	V		V		V		V	
New Tyle	V		V		V		V	
Pan Bride	V		V		V		V	
Aberlemno	V			V	V		V	
Monikie	V			V	V			V
Carmyllie	V			V		V		V
Inverarity	V			V	V			V
Arbirlot	V		V		V			V

The outcomes tended to be in agreement with the previous profile, although there were some discrepancies that could be further explained. Edzell and Panbride got a low and a high value respectively for factor IV which was the reverse in the other profile. However, the reason for this was that although the variable on the potential water availability had the highest loading factor in factor IV, there were other variables moving towards the other direction which played down, or influenced the value of factor IV, while in the other profile, potential water availability was considered independently. The low value for factor II for Inverkeilor and Glamis was due to the heavy influence of population density on the value of factor II. Such variable, however, was not taken into consideration in the other profile.

The breakdown per planning area (Table 4.3.3.) showed that 40 percent of the priority areas were within the Arbroath-Carnoustie planning area, 75% in Montrose-Brechin and 35% in Forfar-Kirriemuir. Although the planning area of Montrose-Brechin had the least number of priority areas, all but one were marked as first priority.

Table 4.3.3. Number of Priority areas per planning area in Angus District

Planning Area ↓	Urban development		Rural development		TOTAL
	1st	2nd	1st	2nd	
Arbroath- Carnoustie	1	1	2	4	8
Montrose- Brechin	1	1	3	-	5
Forfar Kirriemuir	1	1	3	2	7
TOTAL	3	3	8	6	20

Kinnetles	1(0.5)	III	4	I	1	III	1.8	III	3(1.5)	II	3.3	II
Airie	2(1)	III	2	III	2	III	1.7	III	3(1.5)	II	3.2	III
Kirriemuir	5(2.5)	I	3	II	3	III	2.8	II	3(1.5)	II	4.3	I
Forfar	5(2.5)	I	4	I	4	I	3.5	I	3(1.5)	II	5.0	II
Guthrie	2(1)	III	3	II	1	III	1.7	III	3(1.5)	II	3.2	III
Rescobie	1(0.5)	III	2	III	5	I	2.5	II	2(1)	I	3.5	III
Oathlaw	1(0.5)	III	4	I	3	II	2.5	II	2(1)	I	3.5	III
Aberlemno	2(1)	III	2	III	5	I	2.7	II	2(1)	I	3.7	III
Tannadice	3(1.5)	II	1	III	2	III	1.5	III	1(0.5)	III	2.0	III
Cortachy & Clova	1(0.5)	III	3	II	4	I	2.5	II	1(0.5)	III	3.0	III
Kingoldrum	1(0.5)	III	3	II	2	III	1.8	III	1(0.5)	III	2.3	III
Linthratten	1(0.5)	III	3	II	5	I	2.8	II	1(0.5)	III	3.3	III
Glenisla	1(0.5)	III	1	III	4	I	1.8	III	1(0.5)	III	2.3	III
Fern	1(0.5)	III	1	III	1	III	0.8	III	1(0.5)	III	1.3	III
Ruthven	2(1)	III	5	I	3	II	3.0	II	1(0.5)	III	3.5	III
Dunnichen	4(2)	I	2	III	2	III	2	II	2(1)	III	3.0	III

* Figures in brackets indicate weighted scores

Ranking system (per sector) : A score of 5-4 gets Rank I

3 Rank II

2-1 Rank III

Classification of composite score (indirectly productive sector)

3,5 - 3,0 = Rank I

2,9 - 2,0 = Rank II

1,8 - 0,8 = Rank III

Classification of composite score(indirectly and directly productive sector)

5,8 - 5,0 = Rank I

4,8 - 4,0 = Rank II

3,9 - 1,3 = Rank III

Appendix Table 4.B. Factor Matrix (Factor Loading 3) for Priority Areas for Rural Development.

Factor ** Variable *	1	2	3	4	5	6	7	8	9	10
1	0.11	0.51	0.50	0.43	0.17	0.30	0.32	-0.22	-0.00	0.07
2	0.08	-0.46	0.01	0.10	-0.48	0.66	-0.08	0.21	-0.18	0.11
3	-0.33	0.74	-0.24	0.18	-0.39	-0.03	0.14	-0.14	0.21	0.00
4	0.06	0.15	0.83	0.40	0.23	0.18	-0.14	0.12	-0.05	0.07
5	-0.91	-0.03	-0.23	0.09	-0.11	0.15	0.04	0.21	0.10	-0.03
6	-0.19	-0.45	0.52	0.15	-0.32	0.03	-0.19	0.22	0.49	-0.10
7	0.92	-0.05	0.32	-0.14	-0.06	-0.07	0.05	-0.03	0.02	0.03
8	0.46	-0.11	0.39	-0.39	-0.04	-0.09	0.49	0.34	-0.12	-0.30
9	0.98	0.04	-0.06	0.11	0.04	-0.02	0.13	-0.03	-0.04	-0.07
10	-0.32	-0.76	-0.12	-0.14	0.44	-0.18	0.05	-0.04	0.05	0.18
11	-0.78	0.09	-0.23	0.10	0.31	0.13	0.10	0.31	-0.29	-0.05
12	0.19	-0.87	-0.03	-0.03	0.36	-0.19	0.10	-0.05	0.13	0.08
13	0.12	-0.36	-0.10	0.67	-0.24	-0.38	0.21	0.22	-0.12	0.11
14	0.34	0.23	0.18	-0.75	-0.16	0.06	-0.31	0.01	-0.19	0.17
15	0.39	0.50	-0.21	-0.19	0.22	0.19	0.34	0.38	0.26	0.33
16	-0.36	0.36	0.48	-0.07	-0.10	-0.69	0.03	-0.02	-0.08	0.09
17	-0.39	-0.07	0.36	-0.59	0.31	0.38	0.10	-0.10	0.13	-0.08
18	0.41	0.14	-0.55	0.38	0.50	0.22	-0.09	-0.11	0.04	-0.13
19	0.21	0.58	-0.26	-0.11	0.32	-0.27	-0.40	0.40	0.10	-0.08
20	0.86	-0.14	-0.10	0.32	-0.01	0.08	-0.26	0.09	-0.03	-0.02
21	-0.27	0.13	0.76	0.34	0.39	0.01	-0.19	0.07	-0.06	0.01

** The first four (4) are the significant factors.

- * Variable 1 - Value of Agricultural Production/ Capita
 2 - Average farm size
 3 - % of Employment in Agriculture
 4 - % change in Agricultural Employment
 5 - % Agricultural Land
 6 - % change in Agricultural Land
 7 - Maximum altitude
 8 - Water Deficit and Acc. Temperature
 9 - Land Use Capability Classification
 10 - Population density
 11 - Road density (km/ha)
 12 - Population/Road-km
 13 - Bus stops per days
 14 - Potential water availability
 15 - Sewerage quality
 16 - Population per doctor
 17 - Population per Hospital Bed
 18 - Spare capacity in Primary School
 19 - Pupils per teacher
 20 - Maximum No. of Hotel Beds
 21 - Total Capital and Recurrent Costs/Capita

[illegible]

13.2 Logic Pert	25	5(2.5)																5(2.5)	3	8		
14. Stracathro																						
14.1 Inchbare	-																	3(1.5)	1	2.5		
14.2 Stracathro	-	5(2.5)	2	0.5														3(1.5)	1	12.5		
15. Edzell																						
15.1 Edzell	763	5(2.5)	1	0.5	5	5			3									0.5	3(1.5)	4	27.8	
16. Careston																						
16.1 Mill of Careston	-	5(2.5)	1	0.5														1.5	5(2.5)	4	13.3	
17. Menmuir																						
17.1 Baljhall Crescent																			5(2.5)	2	4.5	
17.2 Tigerton	10		1															1.5	5(2.5)	2	8.3	
17.3 Kirkton of Menmuir		5(2.5)	1																5(2.5)	2	8	
18. Lehnnot Navar																						
18.1 Bridgend of Lehnnot	-	5(2.5)	1																3(1.5)	5	12	
19. Loch Lee																						
19.1 Tarfside	29	5(2.5)	1		5													1.5	1(0.5)	4	13.8	
20. Inverarity																						
20.1 Inverarity	76	5(2.5)	1																5(2.5)	1	10.5	
21. Gjamis																						

21.1 Glamis	206	5(2.5)	2	1		5	4		4					5					5(2.5)	5	31
21.2 Padanaram	211	5(2.5)							4								1		5(2.5)	5	15
21.3 Charleston	71		2	1	0.5		4		4					5				5(2.5)	5	24	
22. Newtyle																					
22.1 Newtyle	661	5(2.5)	2	1			2	3										5(2.5)	3	20	
23.Eassie & Nevay																					
23.1 Balkeerie	-																	5(2.5)	3	5.5	
23.2 Kirkinch	-																	5(2.5)	3	5.3	
23.3 Eassie Muir	-	5(2.5)	2	1		5	2											5(2.5)	3	18	
24. Kinnettles																					
24.1 Douglastown	-		2	1			2									3		5(2.5)	3	12	
24.2 Kinnettles	-																	5(2.5)	3	5.5	
25. Airlie																					
25.1 Airlie	35	5(2.5)						2	4									5(2.5)	1	12	
25.2 Craigton of Airlie	-		2	1		5	2									1.5	0.5	5(2.5)	1	14.5	
26. Guthrie																					
26.1 Guthrie	71		1	0.5		5	2											5(2.5)	1	1.2	
27. Rescobie																					
27.1 Burnside	-															1.5		5(2.5)	2	5.3	
28. Oathlaw																					
28.1 Bogindollo	66							3						5				5(2.5)	5	15.5	

28.2 Oathlaw	40		1	0.5														5(2.5)	5	9	
29. Aberlemno																					
29.1 Aberlemno	45	5(2.5)	1		5	3	3				3		3					5(2.5)	4	25.5	
29.2 Pitkenney	-	5(2.5)				3						5						5(2.5)	4	17	
30. Tannadice																					
30.1 Tannadice	91	5(2.5)	1		5	2	3				3							5(2.5)	2	21	
30.2 Menus	26																	5(2.5)	2	4.5	
30.3 Milton of Ogilvie	25																	5(2.5)	2	4.5	
31. Cortachy & Clova																					
31.1 Dykehead	45		1	0.5	5	2												1(0.5)	3	12	
31.2 Inchmill	-																	1(0.5)	3	3.5	
31.3 Cortachy	-	5(2.5)													3			1(0.5)	3	7.5	
31.4 Clova	-	5(2.5)	1		5	2												1(0.5)	3	14	
31.5 Glenprosen	-	5(2.5)																1(0.5)	3	6	
32. Kingoldrum																					
32.1 Kingoldrum	45	5(2.5)	1	0.5	5	2												3(1.5)	3	15.5	
33. Lintathen																					
33.1 Bridgend of Lintathen	-	5(2.5)																			
33.2 Kilry	-	5(2.5)																			
34. Glenisla																					
34.1 Foida	-		1																		
																		1(0.5)	1	5.5	

APPENDIX TABLE 4.D. SCORES PER TOWN, PER SECTOR (FOR THE HIERARCHIZATION OF URBAN CENTERS)

FUNCTIONS TOWN	ESTIMATED POPULATION (1980)	POPULATION DENSITY	Δ % IN DWELLING UNITS		% EMPLOYED IN TOWN TO TOTAL EMPLOYED IN DISTRICT	% EMPLOYED PER ECONOMIC ACTIVITY		POTENTIAL WATER AVAILABILITY	TYPE OF SEWERAGE SYSTEM					
			Δ % IN POPULATION (1977-1980)			MANUFACTURING	CONSTRUCTION		SERVICES	TOTAL	SEPARATE	PARTLY SEPARATE	COMBINED	SEPTIC TANK(S)
ARBROATH	22921	4(2)	1 (0.5)		5	0.6	1.2	0.5	4.7	3	-	4	-	-
CARNOUSTIE	8299	3(1.5)	3 (1.5)		1	3	0.3	0.1	1	1	-	4	-	-
MONTROSE	11166	5(2.5)	2 (1)		3	1.8	1.5	0.3	3.6	2	-	4	-	-
BRECHIN	7193	2(1)	5(2.5)		2	0.8	0.6	0.2	1.6	2	-	4	-	-
FORFAR	11833	3(1.5)	1 (0.5)		4	0.6	0.9	0.4	3.7	1	-	4	-	-
KIRRIEMUIR	4957	2(1)	4 (2)		1	2.4	0.3	0.1	1	2	-	4	-	-

Figures in brackets indicate weighted scores

Weighting scale within functions: (a) Percentage employed per economic activity (manufacturing=3, construction=1.5, services= 0.5); (b) type of roads (A=2,B=1,C=0.5,railroad= 1.5);

Health manpower (Doctor=3, dentist= 1, nurses= 1)

* Centres with ≥ 5 "A" roads get a score of 2

< 5 "A" roads get a score of 1.5

** Centres with doctors > 10 get a score of 3

7-9 get a score of 2

< 7 get a score of 1.5

TYPE OF SEWAGE TREATMENT			TYPE OF ROAD			TYPE OF SCHOOL			HEALTH FACILITIES				HEALTH MAN POWER			HOTEL BEDS	WEIGHTED TOTAL SCORE			
FULL	PARTIAL	NONE	A	B	C	RAILROAD	TOTAL	PRIMARY	SECONDARY	TOTAL	HOSPITAL	HEALTH CENTRE	CLINIC	TOTAL	DOCTOR			NURSE	DENTIST	
-	3	-	1.5	1	-	1.5	4(2)	2	3	3	3	-	1	4(2)	3	1	1	5(2.5)	34	ARBROATH
-	-	1	1.5	1	-	1.5	4(2)	2	3	3	-	1	-	1(0.5)	1.5	1	1	3.5(1.8)	20	CARNoustie
-	-	1	2	1	-	1.5	4.5(2.3)	2	3	3	3	-	1	4(2)	3	1	1	5(2.5)	29	MOUTROSE
5	-	-	2	1	-	-	3(1.5)	2	3	3	3	1	-	4(2)	1.5	1	1	3.5(1.8)	27	BRECHIN
5	-	-	2	1	-	1.5	4.5(2.3)	2	3	3	3	-	1	9(2)	2	1	1	4(2)	32	FORFAR
5	-	-	1.5	1	-	-	2.5(1.3)	2	3	3	-	1	-	1(0.5)	1.5	1	1	3.5(1.8)	23	KIRRIEMuir

(c) Type of school (primary=2, secondary=3); (d) health facilities (hospital=3, health centre=1, clinic=1)

CHAPTER V : IDENTIFICATION OF PRE-FEASIBILITY STUDIES IN PRIORITY AREAS

5.1. Introduction

Lack of adequate water supply, sewerage and sewage treatment facilities, financial constraints and lack of employment opportunities tend to form a complex of development problems in the Angus District. The field investigations into a range of these problems indicated results that need sectoral as well as "area" approaches to the solution of these problems.

This chapter attempts to present a synthesis of the various broad spatial aspects , as well as specific "areas" (parish/settlement), needing further investigation based on recommendations contained in the sectoral reports. It should be noted that the call for "area" investigations is not meant to replace sectoral investigations and planning. Rather the aim is that the entire development activity in the given area is properly integrated so that the best possible results are achieved. However, following the development goal of economic growth, it is recommended that prioritization of further investigations should give first consideration for to urban centres - where resources, facilities etc. are concentrated; the rural areas and problems covering wide areas (number of parishes) will be considered later.

5.2. Sectors for further investigation

These consist of spatially bound areas of further investigations in the various sectors:

5.2.1 Agriculture and Land Use

It is recommended that further investigation is made into the land-use problem aimed at solving the land-use conflict through an integrated urban and rural land use policy for the whole of Angus District.

5.2.2 Industry

Pre-feasibility (i) into provision of sites for large industries, agro-industries, timber production, conservation of nature and recreation.

(ii) for oil related development, the possibility of getting major industrial sites at Barry Buddon Peninsular and Kinnarber (Montrose).

5.2.3. Tourism

(i) The profitability of providing the District (especially the Angus Glens and the Coast with facilities such as public toilets, map and information boards, car parks at various tourist points, is recommended for further studies.

(ii) A further study is also needed to assess the District's capability of absorbing greater numbers of tourists without becoming over-crowded.

(iii) Further studies into organizing day-excursion trips to the Glens to cater for those without private cars who are at present effectively debarred from exploring the area.

(iv) The tourist potentials of the coastal belt (from Barry to Montrose and parts of parishes of Rescobie, Aberlemno, Kinnell, Farneil, . . . are to be further investigated.

5.2.4. Housing

(i) Further studies are needed into the possibility of private entrepreneurs going into the construction of houses in order to alleviate the present pressure on the Local Council.

(ii) The possibility of getting new housing development sites outside the present urban boundaries is recommended for further studies.

5.2.5. Demography

The possibility of meeting the housing needs of the ageing population is recommended for further investigation.

5.2.6. Health

Due to excess hospital bed capacity in the District, it is recommended that provision of basic health facilities in the rural areas be rather emphasized. A pre-feasibility study into locating clinics and/or health centres at Edzell and Newtyle is recommended, as well as further studies into alternative use of the excess hospital beds.

5.2.7 Education

- (i) Further studies are recommended for the situation in the Highlands, (Lethnot and Navar, Cortachy and Clova, Lintrathen) for a better policy for maintaining the existing schools, bearing in mind travel distance to school.
- (ii) Alternative uses for spare capacity in primary school is to be further investigated, especially in Tanadice, Kirriemuir, Edzell, Brechin, Carmyllie and Monikie.
- (iii) Possibilities for better financial allocation in education is also recommended for further studies.

5.2.8. Water

In view of observed undercapacity (in terms of water availability) of the major industrial points (centres) to accomodate further development, a comprehensive pre-feasibility study into the water supply situation is emphasized.

5.2.9. Sanitation

It is recommended that the possibility of providing parishes not now having sewerage treatment facilities, with at least partial treatment be studied further.

5.2.10. Road and Transport

- (i) It is recommended that further studies be made into the possibility of increasing the roadnetwork in the following parishes - Barry, Panbride, Newtyle, Glamis, Edzell - which have become important rural centres.

(ii) Also for further consideration is the possibility of extending a post-bus service to the eight parishes having problems of accessibility, i.e. Glenisla, Lintrathen, Fern, Tanadice, Loch Lee, Lethnot and Menmuir.

5.2.11. Government Administration, Planning and Finance

Further studies into the feasibility of converting large public expenditure (i.e. in social and physical infrastructure) to the directly productive sectors - especially in Forfar, Arbroath, Montrose, Monikie, Edzell, Aberlemno, Inverarity, Rescobie.

5.3. "Area"-specific pre-feasibility recommendations

Within the priority areas prefeasibility studies are recommended according to their specific problems and aim at benefiting these areas to viable and profitable economic entities.

5.3.1. First Priority Urban Centres (Major Centres)

- ARBROATH Further studies into provision of more houses relative to increasing industrial development. Also the possibility of expanding the manufacturing industry (to offer more employment) in oil-related industry together with considerations for removal of the water supply constraints. Investigations are needed to find out how specific public expenditures could be converted towards economic growth.
- MONTROSE First consideration be given to the poor water supply situation and at least partial treatment of sewerage. It falls into second priority in the search for areas for reactivating, and furthering industrial activities (oil related, textile etc.) It also falls under areas with large public expenditure, needing further studies.
- FORFAR Despite its role as a District Administrative Centre, its large public expenditure is to be further investigated with the aim of re-directing expenditure towards economic growth.

Further studies into the ability of the centre to activate and expand its manufacturing sector in order to provide more employment in view of its favourable water supply situation.

5.3.2. Second Priority Urban Centres (Minor Centres)

- BRECHIN Needs further studies into the water supply situation. Its ease of accessibility offers it as an area for further studies into oil-related industries. Excess or spare capacity in its primary schools are to be investigated further in order to eventually convert them into other uses e.g. Nursery, recreation etc.
- CARNOUSTIE Further studies are recommended for the possibility of Barry Buddon Peninsular becoming a major industrial site for oil - related activities. Also the need for at least partial sewerage treatment, and increasing the road network of the parish are for further investigations.
- KIRRIEMUIR The possibility of improving the domestic water supply situation is recommended for further studies considering the fact that the parish is rapidly becoming a "dormitory town" due to its increasing dependence on Forfar and Dundee for both employment opportunity and specialized services.
- 5.3.3. First Priority for Rural Areas (Rural Key Centres) including Craig .
- KIRKDEN In view of its ideal conditions for growth and expansion, it is necessary to study how to maximize the wide range of services and facilities already existing, especially towards industrial development.
- INVERKEILOR With its favourable water supply situation, further investigations are needed as to the extent to which further growth would be possible under limitations of "A" class agricultural land and lack of proper drainage.

- LOGIE PERT Has marginally favourable water supply, and further studies are needed as to how to make use of its favourable environment for growth.
- EDZELL Further studies are recommended for increasing the road network and the housing situation (inspite of heaving public expenditure in housing); the excess capacity in primary schools, its favourable water supply situation and proximity to Montrose, offers it for further studies in locating touristic sites.
- GLAMIS Rather favourably disposed for development in view of its favourable water supply situation except that it falls into a conservation area. Its tourist potential is to be further investigated as well as the need to increase its road network.
- DUNICHEN Has marginally favourable position and could be further investigated for location of agro-industries.
- NEWTYLE Highly favoured for development in view of its good water supply situation and a secondary school, except that the local Authorities limit any further major industrial set up. Further studies are recommended into increasing its road network and redressing the present overcrowded situation in its primary schools.
- CRAIG *
- 5.3.4. Second Priority for Rural Areas (Rural Key Centres, including Carmyllie and Inverarity).
- PANBRIDE Further evaluation of this parish is needed, leading to accepting its lowering in rank. Special attention should be given to the possibility of increasing the road network . especially linking it to the Carnoustie System. Its water supply situation, to accomodate some more houses inspite of good agricultural land, is recommended for further studies.

- * CRAIG In view of its large population it is recommended that the water supply situation is given priority attention for further investigation.
- It is also recommended that further studies be undertaken aimed at improving the status of the town through provision of additional facilities and services.
- ABERLEMNO With its favourable water supply situation and high public expenditure on roads, further investigations are needed into what development potentials there are in view of the physical limitation of the place for development.
- ARBILOT Has marginally favourable water supply situation but falls under "Conservation Area Status" by reason of its setting. However, it is recommended that further studies are made as to the profitability of the limited housing sites available.
- MONIKIE The water supply situation, the issue of excess capacity in the primary schools (in view of high public expenditure in the sector) are recommended for further investigations. Otherwise it has spare capacity for 100 more houses which should be developed alongside consideration for other employment generating activities.
- CARMYLLIE Unfavourable water supply situation and lack of other development potential - apart from agriculture and forestry, but marginally served with facilities for growth call for further studies into this parish. Also the question of excess capacity in the primary school needs to be studied further.
- INVERARITY It is necessary to study again the water supply situation and the parish's growth potentials.

5.3.5. Third Priority Areas

Among the remaining parishes, the following further investigations are recommended:

(i) The parishes of Glenisla, Linthraton, Fern, Tanadice, Loch Lee, Lethnot and Menmuir are to be investigated as to the possibility of extending a post-bus service to these areas in order to make them more accessible.

(ii) Large public expenditure on roads in Rescobie is to be further investigated with respect to expected economic returns to the area.

5.4. General Recommendations

Financial constraints due to Budgeting Control from the Central Government resulting in inadequacy and untimely release of funds were realized to be one of the major bottlenecks to project implementation in the Angus District. It is recommended that some amount of further decentralization and flexibility is introduced into the system - at least at Regional Level. Inter-Agency coordination was found to be a bit slack in the field of development planning. It is necessary that steps are taken to integrate the various agencies and organisations to enhance effective coordination amongst them. This would also lead to effective data storage. Statistical data is at present available at aggregate level, especially at Regional and National level. There is an urgent need for data availability at District level in order to promote effective local planning.

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PART II: SECTORAL REPORTS

A-K

SECTORAL REPORT A

AGRICULTURE
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AGRICULTURE

A.1.0 Present Situation

The total land area of the Angus District is estimated at about 211,200 hectares. At the end of 1980, 81,274 hectares were occupied by agriculture representing about 38.5% of total hectarage and a significant portion of the land resources of the district. Some 48,077 hectares or 59% were in crops, and 33,197 hectares or 40% in grassland.

Table A.1.1.a, shows the percentage agriculture to total land area by parish.

The topography, other physical features, and water availability to a large extent dictate the type of agriculture. On the areas above the "head dyke", grazing is predominant on intermediate soils. Some grain is planted, produced mostly for bulky feed during the winter. Forrests are cultivated on poorest soils for protection from wind and conservatia. On the south facing slopes, frost does not affect the ripening of fruit and some fruit are grown. In general, farmers of the glen area are restricted in their range of activity.

A.1.0.1 Crop production

Production of grains, vegetables and soft fruit, and increasingly horticulture, which are highly profitable in this period, is more feasible on the better lands of The Strathmore Valley and South East parishes, Arbirlot, Panbridge and Arbroath.

Of the cultivated area, barley was the dominant crop occupying 76% of the total. Potatoes occupied some 12% while wheat , soft fruit and vegetables together occupied about 11% of cultivated land area.

Between 1971 to 1980, the area under barley, potato and vegetables increased by about 38.8%, 21.4% and 10.8% respectively. At the same time, wheat, oats, and soft fruit and grassland decreased by an average of 45%.

See table A 1.1.b.

The average farm size is about 95 hectares, since about 70% of farms were distributed somewhere between 60 and 170 lectures. See Table A 1.1.c.

The size of the farm is increasing due to increased mechanization to meet timely land preparation and harvesting. This is also associated with the high level of technological management adopted by most farmers of the area.

Almost all production of crop and livestock are commercialized in nature.

TABLE A.1.1.(a)

HECTARAGE/PERCENTAGE AGRICULTURAL LAND USE BY CROP TYPE

Parish (Land Area)	Grains	%	Potatoes	%	Vegetable	%	Grass	%
Newtyle (1148)	549.4	45.8	105	8.7	178.7	14.9	365.3	30.4
Craig (1459)	905.5	62	131.8	9	50.7	3.4	371	25.4
Farnell (2035)	1071.7	53	203.6	10	59.5	4.7	664.2	18.3
Inverkeilor (3070)	1903	62	297	9.7	199	6.4	671	22
Kinnel (1687)	1008.1	59.8	168.7	10	99.3	5.8	410.8	24
Careston- Brechin (4765)	2540.5	53	400.1	8.4	201.9	4	1589.9	33
Dun (1562)	976.8	63	105.6	6.7	56.4	3.6	237.6	15.2
Edzell (1448)	411	28.3	51.90	.4	107	7.4	876.5	60.5
Lethnot (1061)	121.1	11.5	38	3.1	25.5	2.4	845.1	79.7
Loch Lee (366.8)	2.8	.76	3.2	.87	8.30	2.3	366.8	98
Logie-Pert (2347)	1287.4	55	262.7	11	107.5	4.5	689.5	29.4
Menmuir(2705)	1069.8	39.5	185.6	6.9	181.1	6.7	1268.3	46.9
Stracathro (1194)	588.5	49.2	165.9	13.9	37.6	3.1	361.6	30.2
Arbirlot	1534.4	59	322.5	12.4	140.8	5.4	599.2	23
Arbroath/ St.Vigeans (36666)	2105	57.4	370.9	10	379.5	10.3	810.9	22
Barry(493)	232	47	64.2	13	59.8	12.1	137	28
Carmyllie (2287)	1207	52.7	276.3	12.1	133.8	5.8	670.3	30
Monikie (2681)	1464.3	55	314.8	11.7	191.1	7.1	711.5	27
Panbridge (1424)	866.5	45	275.6	14.2	10.6	.5	638.2	33
Aberlemno (2505)	1281.8	51	208.8	8.3	183.4	7.3	833.1	33.3
Dunnichen (1174)	664.8	56.6	103.3	8.7	69.3	5.9	337.5	28.7
Eassie-Nevay (1504)	697	46.3	142.8	9.4	180.7	12	484.1	32.2

Parish (Land Area)	Grains	%	Potatoes	%	Vegetable	%	Grass	%
Forfar (2195)	1042.3	47.4	229.7	9.1	229.7	10.5	722.5	32.9
Glamis (3032)	1349.5	44.5	202.2	7.8	202.2	10.5	1244.1	43
Guthrie (493)	565.3	56.9	66.4	23.8	66.4	6.7	244.8	24.6
Inverarity (3175)	1647.8	51.8	181.7	9.3	181.7	5.7	1050.2	33
Kinnettles (1068)	654	61.2	50.8	8.2	50.8	4.7	257.3	25
Kirkden (1864)	1087.9	58.3	95.1	10.5	95.1	5.0	485.8	26
Oathlaw (1316)	671.9	51	77.3	4.3	77.3	5.8	481.8	37
Rescobie(2333)	332	14.2	196.5	8.4	226.1	9.6	678.4	29
Airlie (2828)	1494.4	53	223.3	7.8	170.9	6	939.9	33.2
Cortachy (1476)	213.4	14.5	29.10	2	117.1	7.9	802.3	54
Fern (1049)	440.9	42	65.2	6.2	59.5	5.6	483.3	46
Glenisla(1847)	258.3	14	44	2.4	119.2	6.4	1426	77.2
Kingoldrum (2048)	602.3	29.8	94.8	4.6	78	4	1240.5	61.4
Kerriemuir (4628)	2294	49.5	376.2	8.2	361.7	7.8	1596.3	34.5
Linthrathven (1858)	302.7	16.2	26.6	1.4	101.1	5.4	1427.7	76.8
Ruthven(5294)	318.8	60.2	11.3	2.1	37.6	7	161.8	305
Tannadice (3951)	1629.9	41	284.6	7.2	205.2	5.1	1832	46.3

1.1(b) : Area of Crop and grassland for Angus District

Land Use	1980		1971		Change from 1971 to 1980	
	area(ha)	%	area(ha)	%	difference	%
1. Wheat	1,321	2,7	3,136	7,4	(1,815)	(57,9)
2. Barley	36,567	76,1	26,352	62,6	10,215	38,8
3. Oats	1,805	3,8	4,930	11,7	(3,125)	(63,4)
4. Potato	6,107	12,7	5,030	11,9	1,077	21,4
5. Vegetable for human consumption	1,193	2,5	1,337	3,2	(144)	10,8
6. Soft fruit	1,084	2,3	1,321	3,1	(237)	17,9
Total area of Crop	48,077	59,2	42,106	51,8	5,971	14,2
7. Grassland	33,197	40,8	39,179	48,2	(5,982)	(15,3)
Total area of crop and grassland	81,274	100	81,285	100	(-11)	(1,2)

1.1(c) Farm size distribution, Angus District (1980)

Farm size (ha)	No.	Percentage
1. Less than 60	6	14.6
2. 61 - 80	10	24.4
3. 81 - 100	6	14.6
4. 101 - 120	12	29.3
5. More than 120	7	17.1
Total	41	100

N.B. Average farm size : 95 ha

A.1.0.2 Livestock Production

Within the surveyed area, livestock including beef and dairy cattle, sheep, pigs and poultry, all show a significant decrease in the number from 1971 to 1980 by approximately 74.2%; 47.7%, 42.8% and 45.4% respectively (Table A.1.1 d). There was no explanation that can be advanced for this decline, however, it was seen there was a general decrease in the area devoted to grassland. The reduction may be due to the shifting to cultivated crops, among other new uses.

A.1.1.(d) Livestock population for Angus District

Type of animal	No. of animal		Change from 1971 to 1980	
	1980	1971	no.	%
1. Beef cattle	17,976	69,680	(51,704)	(74,2)
2. Dairy cattle	5,955	11,399	(5,444)	(47,8)
3. Sheep	91,306	174,604	(83,298)	(47,7)
4. Pig	14,259	24,924	(10,655)	(42,8)
5. Poultry	161,346	295,430	(134,084)	(45,4)

A.1.0.3 Agricultural Employment

Employment in Agriculture in the Angus District accounted for about 4.81% of the total labour force for the whole District. From 1971 to 1980 there was a downward trend in the number of persons employed in Agriculture to about 16.4%. The employment generating capacity of the agriculture sector is very small in comparison with other economic sectors. However, it is to be noted that it contributes to stemming rural population.

A.1.1 Development Problem

As far as the agricultural sector is concerned, there is no real development problem. This is because agriculture is a modern, efficient sector utilizing latest technology with high level of mechanization and high skilled work force; thus agricultural activities are highly developed and need little government interferences. The role of government agency is recognized mainly in the regulation and control of agricultural output through licensing and quotas. The only noticeable problem existing in this area is the conflict between agricultural activities with other economic activity for land. This is due to the fact that most of the soil surrounding the urban area are of the highest quality, mainly class A1, A and B1.

Hence the investigation of the agriculture sector will be focused on the effect of this sector on the national economy as a whole.

A.1.2. Development policies

No clearly defined policies exist within the agricultural sector. However, there are 3 central objectives of agricultural policies of the United Kingdom since 1947:

- a) to achieve a level of production consistent with the national interest
- b) to ensure supplies of food to consumers at reasonable prices
- c) to ensure a reasonable standard of living for farmers and farm workers.

At regional and local level, these policies are implemented through agricultural production grant by the Department of Agriculture and Fisheries.

The specific development policies at regional and local level are very weak and not clearly stated and this is reflected in the Tayside structure plan. The only distinct policy related to the agricultural sector which can be found is the Tayside structure plan, the conservation of agricultural land which is classified as A1, A and B1 in quality. However, even this is not a strong policy since it went on to state that if a clear need was identified those lands could be used for other purposes.

Chapter II

A.2.1. Sectoral Methodological Approach

During the data collection period in the field, general problems arose from the gap between available information and data requirements. Those were particularly related to data on non-agricultural land use and forestry, at district and parish levels.

The data finally collected were used to determine homogeneous zone classification. Nine variables were selected in accordance with the nature of the development problems and subsequently the development objectives. It is important to recall here that the primary planning problem in agriculture arises out of the conflict of land uses resulting from a need to promote new economic activities. Agriculture is not a development carrier in the area and the selection of variables should therefore reflect this.

At the same time, indicators of the level of productivity, the scale of production and employment opportunities in the sector had to be identified. Those variables which gave a view of the existing situation in Agriculture, were assessed in a somewhat different way, than those which attempted to gauge the contribution of agriculture to economic growth, in relation to other activities.

Hence, we have a distinction between indicators of the factors which contribute to the development of agriculture, as a sector. A high score in these variables denotes a high contribution to the development of Agriculture, which even in the context of the Angus district, where this sector has ceased to be a carrier of development, must be viewed as a source of income for its participants, and a contributor to the national economy. The promotion of intensive, technologically advanced, and commercial agriculture will contribute to a better standard of living for the rural population and with the provision of basic facilities and service lay the basis for "...a hierarchy of multi-purpose central places".

Yet, it is recognized that there is a need to promote more industrial development, and other economic activities. Therefore, where agriculture is seen to be giving way to urban uses, this is viewed as a positive movement in the direction of economic growth. The variables which measured these movements were analysed in such a way that parishes with alternative activities received high scores. These referred to changes in employment and land use over a 9 year period.

A 2.2 Collection of Data

During the fieldwork, attempt was made to get information on the contribution of the Agricultural Sector to the development in terms of its input to the National Product of Employment. Information regarding crops such as yield, management information and some details on mechanization were also sought.

Within the given time frame, some of those data were collected. The major source of data for the agricultural sector was the Agricultural Return Census for Scotland for 1971 and 1980, and the Department of Agriculture and Fisheries.

The major difficulties were to get information at the Angus District and parish level particularly for non-agricultural land use. The limitations presented by the non-availability of data at the Angus District level and parish level were in the following areas:

1) Agriculture and livestock

Yield

Number of machinery

Level of management and production

2) Non Agricultural Land Use - Not available at parish and by land use types.

A 2.3. Variables for Homogeneity Analysis

The basis for the selection of variables was the availability of data at the parish level.

They were calculated mainly from data on the Agricultural Return and Physical Information maps.

The values of these variables are classified into 5 and 10 classes based on a score in favour of economic growth. The higher the contribution, the higher the score received.

A 2.3.1 Definition of variables

A. Variables contributing to Agricultural Development.

Variable I. - The total value of crops and livestock production per capita per year.

The value of crops was calculated by multiplying the total area under crop by yield per hectare and the price per ton for all major crops. These included wheat, barley, oats, potatoes, raspberries and strawberries. The value of livestock was calculated by multiplying the number of head by the production per head and the price per unit of produce. These included beef and dairy cattle, sheep, pigs and poultry. The total value was then obtained by adding the value of crops and livestock. Assumptions made in the calculation of this variable are given in Appendix A.2.3.1.

Variable II. - The average farm size.

This was calculated by dividing the total farm area by the number of holdings and is an indicator of economic efficiency of agricultural production. Large production scale usually relates to mechanization and therefore high levels of technology. The larger the farm, the greater the output so parishes with large average size received high scores.

Variable VIII. - The Potential Water Deficit and Accumulated Temperatures.

The potential water deficit is the excess of potential evapotranspiration over rainfall. This is expressed in millimeters.

The accumulated temperature is defined as the excess or deficiency of temperature with reference to a fixed datum. In this case a base temperature of 5.6°C , approximately the level at which plant growth commences was selected. The unit used was the day degrees Celcius and the period was one year. The areas were then evaluated based on plant growth requirements. Those areas with best conditions for plant growth were scored highest.

Variable IX.- Land Use Capability and Utilization.

This variable accesses a composite of physical factors, including water deficit, soil conditions and altitude. Since land capability and utilization have a positive relationship, these two factors were grouped together. Favourable conditions for agricultural production were scored positively.

These four variables represent the determinants of productivity in the Agricultural Sector and positively scored variables are those that contribute highly to increase the level of output in the sector.

In the context of the low profile being played by the agricultural sector in initiating and sustaining higher economic growth levels in this period, the following set of variables (grouped as B) scored agriculture negatively as against other activity promoting growth and urbanisation.

B. Variables Contributing Directly to Economic Growth

Variable III - The Percentage of Population employed in the Agricultural Sector.

The value of this variable was calculated by dividing the total population employed in agriculture by the economically active population. In general, the lower numbers employed in the agricultural sector imply that other enterprises provide employment in the area. This must be viewed as a possible contribution to economic growth. The relation between this and Variables I and II is not always predictable.

However, the tendency is that parishes with high scores in these variables also receive a high score for employment in agriculture. The more efficient production, the lower the employment in agriculture.

Variable IV - Percentage change of employment in the Agricultural Sector from 1971 to 1980.

Calculation of this variable was done by dividing the difference in the number of people employed in the agricultural sector in 1971 and 1980 by the total employed in 1971. Those parishes with a decrease in percentage employed over the period received a high score.

Variable V - Percentage of area under agricultural use.

This variable was calculated by dividing the total area under agriculture by the total area of the parish, and then multiplying by 100. In this case the smaller the area under agriculture, the higher the score received.

Variable VI - Percentage change from agricultural land use to other uses.

This variable was calculated using the difference between percentage agricultural land use in 1971 and 1980 and dividing by the total agricultural land use in 1971. This variable indicates the trend in agricultural land use for the period of 10 years. The more percentage changes from agricultural use to other development, the more favourable for economic growth.

Variable VII - Altitude.

The maximum altitude was used to indicate physical constraints of the area for development. The higher the altitude, the less suitable the area is for agriculture because of the lower temperatures and shallow soils. It is therefore less favourable to economic growth.

2.3.2 Scoring

For variable I to VII all the values were classified into 5 classes. Those values which were favourable for economic growth were given high scores, that is 5, and the values contributing less were given score 1. The same principle was applied for variable VIII and IX except that these variables were classified into 10 classes qualitatively in order of magnitude in relation to plant growth requirement. The value and scoring for all variables was summarized in Table A.2.3 (a) A.2.3 (b) and A 2.3(c). Based on these tables, the value of the variable as in Table A.2.3(d) were then given the score and summarized in Table A.2.3(c).

2.3.3. Determination of homogenous zone

In order to arrive at homogenous zone classification, the score for each variable added together to obtain the total score for 9 variables (Table 2.3. c d). These scores were then arranged in order of magnitude from high to low. The parish with highest score was given number 41 and the parish with lowest score was given number 1. Then the order of magnitude was tanked according to Table 2.3 (f). This way of ranking was carried out to make sure each rank has approximately the same number of parishes.

A 2.3(a)

Classification of value according to scores for variable I to variable VII.

Score Variable	1	2	3	4	5
I (£'000)	10 and below	11 - 20	21 - 30	31 - 40	41 and above
II (Hectres)	60 and below	61 - 80	81 - 100	101 - 120	121 and above
III (Percentage)	40 and above	39 - 30	29 - 20	19 - 10	9 and below
IV (Percentage)	(-40 and below	(-39) - (-20)	(-20) -0	1 - 20	21 and above
V (Percentage)	80 and above	65 - 79	50 - 64	30 - 49	29 and below
VI (Percentage)	(-5) and less	(-4) -0	1 - 5	6 - 10	11 and above
VII (meters)	400 and above	300 - 399	200-299	100-199	99 and below

A. 2.3 (b)

Score for potential water deficit and accumulated temperature

Description of condition	Score
1. Warm, dry lowland	10
2. Warm, moist lowland	9
3. Warm, wet lowland	8
4. Fairly warm dry, lowland	7
5. Fairly warm, moist lowland and foothill	6
6. Fairly warm, wet lowland and foothill	5
7. Cool dry lowland	4
8. Cool moist lowland, foothill and upland	3
9. Cool wet lowland, foothill and upland	2
10. Very cool wet upland and mountain	1

Note: The scoring is based on plant growth requirement.

A. 2.3 (c) Scores for Land Use Capability and Utilization

Description	Score
1. Good quality land, first class land, level or gently undulating, deep fertile loams, selts, mild peat often intensively cultivated	10
2. Good general purpose farmland, well drained, soil of good depth, workable for much of the year, arable	9
3. Ley farming with more grass in the west	8
4. First class land, similar to 1, but with high water table or liable to flood, grassland, fattening pastures and best dairy pasture	7
5. Good, but heavy land, fertile but period of work restricted	6
6. Medium quality land, shallow light soil including machair land, ploughable areas.	5
7. Basic pastures where unploughable	4
8. Medium quality farm land, productive but by reason of slope, climate or soil not first class, often very mixed farming crops and grass.	3
9. Poor quality heavy land, with very heavy wet soil or undrained bogs. Grassland with rushes, grading to wet moor and bog or moss	2
10. Poor quality mountain land, thin poor stony soils often with rock outcrop or patches of peat. Mountain moorland or rough pasture	1

A 2.3 (d) Value of variables

	1	2	3	4	5	6	7	8	9
1. Brechin	21.43	95.3	4.26	(36.2)	73.3	(6.4)	130	4	2
2. Careston				(28.0)			350	5	2
3. Dun	14.86	98.3	34.0	(35.9)	76.5	8.9	111	1	1
4. Edzell	26.25	120.7	8.1	33.3	18.8	0.1	677	5	5
5. Lethnot	31.36	75.8	50.0	(12.5)	9.9	6.4	868	6	5
6. Loch Lee	11.97	27.2	32.4	(5.2)	1.6	(42.0)	939	9	10
7. Logie Pert	17.93	130.4	29.1	(12.9)	100.0	3.8	170	4	1
8. Menmuir	18.83	117.6	38.7	0	62.9	5.1	298	5	2
9. Stracathro	18.03	74.6	11.5	(1.5)	51.4	10.7	119	5	5
10. Abirlot	20.8	103.9	29.7	(18.7)	96.2	13.2	107	1	1
11. Arbroath	54.25	60.1	1.4	(38.8)	71.9	(1.0)	184	1	1
12. Barry	34.79	30.8	0.9	20.0	23.5	(31.3)	18	1	1
13. Carmyllie	36.38	61.8	45.6	(26.9)	76.3	(15.7)	117	1	2
14. Monikie	41.03	74.5	18.8	148.1	74.5	10.4	211	4	1
15. Panbridge	7.21	74.0	20.1	(18.7)	77.0	10.9	156	1	1
16. Aberlemno	18.06	73.7	37.7	(41.1)	69.6	(1.2)	252	5	2
17. Dunnichen	12.64	45.2	9.0	(51.7)	69.1	(11.4)	233	5	2
18. Essie-Nevay	9.3	107.5	21.0	(46.2)	75.3	4.8	290	1	2
19. Forfar	14.64	48.8	1.4	(22.9)	64.6	(3.5)	235	5	2
20. Glamis	19.09	84.23	22.9	0	52.3	0.7	455	5	2
21. Guthrie	27.70	76.4	28.3	(17.1)	90.4	6.1	148	4	2
22. Inverarity	21.77	90.7	34.8	(12.5)	70.6	3.6	259	5	2
23. Kinnettles	17.77	152.6	29.2	46.3	82.2	(5.0)	164	5	2
24. Kirkden	12.05	88.8	19.3	(28.6)	84.7	5.9	168	4	2
25. Oathlaw	16.20	87.8	24.1	(7.5)	62.7	(4.4)	239	5	2
26. Rescobie	17.75	97.2	10.4	(7.5)	93.3	3.8	252	5	2
27. Airlie	20.36	117.9	25.7	(26.7)	78.6	4.4	168	5	2
28. Cortachy	16.17	59.0	35.2	0	57.9	2.7	1010	6	10

	1	2	3	4	5	6	7	8	9
29. Fern	10.98	116.6	19.1	12.8	29.1	(8.8)	579	5	5
30. Glenisla	19.03	73.5	35.1	(11.1)	11.1	(4.8)	1062	9	10
31. Kingoldrum	73.56	144.9	35.8	(22.2)	51.7	7.3	559	6	5
32. Kirriemuir	13.80	72.3	4.4	(38.7)	75.9	3.0	310	5	2
33. Lintrathen	17.54	80.8	25.6	(33.3)	20.4	9.0	688	9	10
34. Ruthven	10.64	88.2	24.3	7.1	5.6	1.9	296	5	8
35. Tanadice	19.15	112.9	29.2	(26.7)	46.0	8.4	726	5	2
36. Craig	16.59	145.9	8.8	(16.6)	85.9	5.9	153	4	1
37. Farnell	79.20	226.1	24.4	9.4	88.5	45.6	117	4	2
38. Inverkeilor	11.94	109.6	23.8	(18.8)	74.9	(12.0)	88	1	1
39. Kinnell	18.33	112.5	15.7	(5.0)	60.3	(3.2)	132	1	2
40. Lunan	26.02	165.3	35.6	(45.3)	90.9	3.2	105	1	2
41. Maryton							28	4	1
42. Montrose	12.49	55.9	0.5	(5.0)	42.8	(9.1)	98	1	1
43. Newtyle	18.70	92.2	9.4	(23.1)	57.8	3.3	345	5	2

A. 2.3(c) Summary of scores and ranks for variables

Parish	I	II	III	IV	V	VI	VII	VIII	IX	Total	Order of magnitude	Rank
1. Brechin	3	4	5	4	2	1	4	7	9	39	9	IV
2. Careston							2	6	9			
3. Dun	2	4	2	4	2	4	4	10	10	47	6	V
4. Edzell	3	5	5	1	-	2	1	6	6	29	34	I
5. Lethnot	4	2	1	3	-	4	1	5	6	76	37	I
5. Loch Lee	2	1	2	3	-	1	1	2	1	13	41	I
7. Logie Pert	2	5	3	3	-	3	4	7	10	37	16	IV
8. Menmuir	2	4	2	3	-	3	3	6	9	32	30	II
9. Stacathro	2	2	4	3	3	5	4	6	6	35	23+	III
10. Arbirlot	2	4	3	3	1	5	4	10	10	42	4	V
11. Arbroath	5	2	5	4	2	3	4	10	10	45	1	V
12. Barry	4	1	5	2	5	1	5	10	10	43	3	V
13. Carmyllie	4	2	1	4	2	1	4	10	9	37	17+	III
14. Monikie	5	2	4	1	2	5	3	7	10	39	19	IV
15. Panbride	1	2	3	3	2	5	4	10	10	40	7	V
16. Aberlemno	2	2	2	5	2	2	3	6	9	33	27	II
17. Dunnichen	2	1	5	5	2	1	3	6	9	34	25	III
18. Essie-Nevay	1	4	2	5	2	3	3	10	9	39	12	IV
19. Forfar	2	1	5	4	2	2	3	6	9	34	26+	II
20. Glamis	2	4	3	3	3	2	1	6	9	33	28	II
21. Guthrie	3	3	3	3	1	4	4	7	9	37	18	III
22. Inverarity	3	4	2	3	2	3	3	6	9	35	24	III
23. Kinnettles	2	5	2	1	1	2	4	6	9	33	29	II
24. Kirkden	2	3	4	4	1	3	4	7	9	37	19	III
25. Oatlaw	2	3	3	3	3	2	3	4	9	32	31	II
26. Rescobie	2	2	2	3	1	3	3	6	9	31	32	II
27. Airlie	2	4	3	4	2	3	4	6	9	37	70	III
28. Cortachy	2	1	2	3	3	3	1	5	1	21	39	I
29. Fern	1	4	4	2	3	1	1	6	6	78	36	I
30. Glenisla	2	2	2	3	5	2	1	2	1	20	40	I
31. Kingoldrum	3	5	2	4	-	4	1	5	6	30	33+	II

	I	II	III	IV	V	VI	VII	VIII	IX			
32. Kirrimuir	2	2	5	4	4	3	2	6	9	37	21	III
33. Linthrathen	2	3	3	4	2	4	1	2	1	22	38	I
34. Ruthven	1	3	3	2	5	3	3	6	3	29	35+	I
35. Tannadice	2	4	3	4	5	4	1	6	9	38+	13+	IV
36. Craig	2	5	5	3	4	3	4	7	10	38	14	IV
37. Farnell	3	5	3	2	1	5	4	7	9	38	11	IV
38. Inverkeilor	2	4	3	3	2	1	5	10	10	40	8	V
39. Kinnel	2	4	4	3	3	2	4	7	9	38	15	IV
40. Lunan	3	5	2	5	1	3	4	10	9	42	5	V
41. Maryton								7	10			
42. Montrose	2	1	5	5	5	1	5	10	10	44	7	V
43. Newtyle	2	3	5	4	3	3	2	6	9	37	77	III

A 2.4. Variable for hierarchization

For the purpose of hierarchization, one variable was selected, that is land use capability and utilization. This is to show the quality of the land and its environment in relation to capability and utilization. In general, the area was classified into 10 categories according to its capability.

2.5 Analysis of homogenous zones

From homogeneity analysis and hierarchization, the Angus district can be classified into 5 zones agriculturally . There are 2 district continuous zones that can be observed from map no. 1 and from table 2.4. That is the mountainous and upland areas comprising the parishes of Glenisla, Lintrathen, Ruthven, Cortachy, Lethnot, Loch Lee, Edzell and Fern. The other areas or parishes were the coastal parishes including Montrose, Dun, Lunan, Maryton, Inverkeilor, Arbroath, Arbirlot, Panbride and Barry. The third class is equally distributed between these two areas. In general these are two major types of variables which discriminate most of the zone namely; climatic related variables such as altitude, potential water deficit and accumulated temperature and land use capability and utilization. These are the variables that distinguish the 2 extreme zones and the worse contributed to economic growth. Whereas the intermediate zone which lies between these two zones is greatly affected by the socio-economic variables such as value of crops and livestock production, employment and farm size. Agriculturally the area which is contributing most to economic growth can be regarded as those areas along the coast. This can be attributed partly to the very good soil present in this area, the flat or gently undulating and the proximity to the urban area.

Table A.2.4. Agriculturally homogenous zones

Type of homogenous zone	Parish
5	Maryton and Lunan, Dun, Montrose, Barry, Inverkeilor Arbroath, Arbircot, Panbride
4	Monikie, Essie-Nevay, Kinnell, Craig, Farnell, Brechtin, Logie Pert, Careston, Tannadice
3	Newtyle, Airlie, Kirriemuir, Inverarity, Carmyllie, Kirkden, Cuthrie, Stratcathro
2	Glamis, Kinnettles, Forfar, Dunnichen, Rescobie Oathlaw, Aberlemno, Menmuir, Kingoldrum
1	Ruthven, Glenisla, Cortachy, Lethnot, Loch Lee, Edzell, Fern

3. Sectoral recommendation

In view of the present situation it is felt that there is a need for a clear definition of the role of the agricultural sector within the national economy as a whole. This is to facilitate the formulation of Agricultural policy at all levels from national to the local and consequently lead to, among other things a clear land-use policy. It is therefore highly recommended that there should be a further study in the field of land use towards the formulation of integrated land use policies in the light of the national priorities so as to reduce the probably conflict between agricultural and non-agricultural land use.

APPENDIX A .2.3.1.Assumptions

1. It is assumed that the yield for major crops such as barley, wheat, potatoes, strawberry and raspberry vary depending on the soil type. Therefore, in our investigations, the yield was derived from the average for Scotland which was published in the leaflet "Agriculture in Scotland 1980". This average was later adjusted based on the soil quality.
2. Yield for livestock was calculated from the farm management handbook where the entire parish has the same average yield.
3. The level of management, and technology practised was assumed to be the same for all parishes. Therefore, the major factors affecting the production figures in an area is the number of animals.
4. The price used in the calculation of value, is from 1980 which is obtainable from the Farm management handbook.

SECTORAL REPORT B

INDUSTRY

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INDUSTRY

B. 1.0

Present situation

The problem in Angus in the past has been the inability to match run down unemployment in big industries with new jobs in other industries. The manufacturing base has been restructured and local dependence on declining industries has diminished, but it has been replaced to some extent by a greater dependence upon small numbers of large scale employers. There are around twelve (12) large scale industries, employing 6,100 people out of the 8513 (72%) employed in the manufacturing sector in Angus District. Job loss in the local textile industry is largely attributable to the UK carpet industry which has had its home and export markets seriously affected by international competition of cheap carpets. On the other hand, the mechanical industry, frozen food processing, paper and printing, oil related and chemical industries are showing great prospects.

The Tayside Manufacturers Register (1980) shows that there are around 543 registered manufacturers. Of the total, 140 (or 26.1%) are in Angus District, 225 (or 41.2%) are in Dundee District, and 178 (or 32.6%) are in Perth District. In Angus most firms are engaged in mechanical engineering and metal manufacture (18.9%). Other important activities are food, drink and tobacco (15.4%), textile, knitwear and jute production (13.3%), and metal goods and metal manufacturing. The distribution of manufacturing units within Angus is not even as the table below will show. There are six (6) major industrial towns - namely Forfar, Kirriemuir, Arbroath, Carnoustie, Montrose and Brechin.

Table B .1.0 (a) Industrial units- Angus District

Town	No. of companies	Employment (no. of people)				
		1 - 25	26 - 100	101 - 200	201 - 500	500 onwards
Forfar	33	18	10	4	1	-
Kirriemuir	9	3	4	-	2	-
Arbroath	36	20	7	6	1	2
Carnoustie	14	10	3	1	-	-
Montrose	30	18	9	2	1	-
Brechin	18	10	6	6	1	-
TOTAL	140	79	39	14	6	2

Source: Extract from Tayside Manufacturers Register.

The Angus District has 40% of all large scale units present in Tayside Region. However, Dundee has the largest percentage (53.3%) and Perth has the least (about 6.7%). On industrial employment, Dundee accounts for 65% Angus has 30.5% and the remaining 4.5% goes to Perth.

A look into the Angus district large scale manufacturing operations shows that they are mostly found in Arbroath (engineering - including oil related engineering). Montrose is second on the list with four units engaged in textile, oil related and other activities. Availability of sites for industrial development continues to be a problem in Angus District. The following table shows the present situation of this important factor for industrial development.

Table B 1.0 (b) Industrial sites in Angus District

Town	Zoned industrial area (not serviced) (acres)	Spare capacity (serviced area) (acres)
Forfar	70	12
Kirriemuir	40	-
Arbroath	192	59 * (a)
Carnoustie	40	-
Montrose	130	16 * (b)
Brechin	53	1
TOTAL	525	88

NB * (a) - The plots are of 57, 1.5, and 0.5 acres

* (b) - The plots are of 6 and 10 acres

Source: Local Structure Plans (Forfar, Kirriemuir, Arborath, Carnoustie, Montrose and Brechin).

; Angus District Council

Only Arbroath has a big spare capacity which can be immediately available but then the largest share of it is under one plot, the remaining being two very small plots. Carnoustie and Kirriemuir have no spare serviced capacity.

From the study "Montrose Industrial Structure" (1980) it was found that there was a predominance of several sectors - food, drink, tobacco, chemicals and allied industries and mechanical engineering. All of them accounted for 16% of employment in manufacturing. However, they represented only 47 of all manufacturing firms.

Table B.1.0 (c) Industrial structure of Montrose Local Employment office area 1980, according to standard industrial classification (SIC)

SIC	No. of firms	Employment number	% of total employment
3	12	781	32.2
4-15	2	564	21.5
6-12	10	105	4.0
7	8	603	23.0
8	1		
9	-	-	-
10	1		
11	1		
12	-	-	-
13	4	294	11.2
14-15	-	-	-
16	3	66	2.6
17	3	71	2.7
18	7	73	2.8
TOTAL		2566	100.0

Extracts from Montrose Industrial Structure (1980)

Within the dominant Standard Industrial Classification (SIC) groups (3, 4-5 and 7) important activities can be distinguished.

Table B.1.0 (d) Industrial Structure - SIC 3,4-5 and 7
Montrose

SIC		No. of firms		Employment	
3	Bread, Flour and Confectionary	1		14	
	Bacon Curing, Meat and Fish Products	3		102	
	Milk and Milk products	1		27	
	Fruit and Vegetable products	3		477	
	Other drink industries	4		161	
	SUB TOTAL		12		781
4-5	Lubricating oils and greases	1		14	
	Pharmaceutical Chemicals of Preparations	1		550	
	SUB TOTAL		2		564
	Iron castings etc.	1		1	
	Agricultural machinery (except tractors)	2		55	
	Other machinery	1		299	
	Industrial (including process) plant and steelwork	1		30	
	Ordinance and small arms	1		10	
	Mechanical engineering	3		170	
	SUB TOTAL		9		565
	GRAND TOTAL		23		1910

Extracts from Montrose Industrial Structure (1980)

Table B 1.0 (d) shows that 61% of the employment in SIC 3 (food and drink) is in the category of fruit and vegetable products (canning and freezing). Employment in SIC 4 and 5 is mainly attributed to one company (Glaxo LTD.) producing pharmaceutical chemicals.

In SIC 7 (mechanical Engineering), 83% of employment is in general fabrication and the manufacture of pumps; valves and compressors.

Table B.1.0(e) below, demonstrates that industrial production in Montrose is dominated by several companies, six main companies account for 63% of jobs in manufacturing industry. However, all of the firms in this area except one are small scale industries. The only large industry employs over 500 people. About 55% of the jobs are in firm employing less than 200 people.

Table B.1.0(e) The Size of Firms in Montrose Local Employment Office Area (LEOA)

size	no.	%	Employment	% of total employment
25	31	60	256	10
26-50	9	17	295	11.5
51-100	6	112	401	15.6
101-150	3	6	491	19.0
151-200	2	4	574	22.4
500	1	2	550	21.5

Extracts from Montrose Industrial Structure (1980)

CHAPTER IB.1.1. Development Problems

Angus District, like the rest of Tayside is experiencing economic recession. Unemployment is on the increase and also some industrial activities are on the decline. The movement of people from rural to urban areas increases the problem of unemployment. However, the change towards capital intensive techniques of production also aggravates the situation.

B. 1.1.1. Unemployment

Industrial expansion is one of the measures always put forward as a solution to unemployment. In Angus District, there has been economic growth in terms of industrial output. However, together with this growth, there have been declining industries, - mainly in the textile sector. The new industrial opportunities created cannot cope with the unemployment created by declining industries, depopulation etc.

Moreover, most industries favour less labour intensive techniques.

Arbroath Unemployment Exchange Area has a higher than average unemployment if compared to Forfar and Montrose. The following table depicts the situation.

Table B.1.1.1.a.

Unemployment in Angus District within unemployment exchange area

	As at June 1979				As at March 1980			
	female	male	total	%	female	male	total	%
Arbroath	530	483	1013	47.3	527	431	958	42.2
Montrose	405	249	654	30.5	500	334	834	36.7
Forfar	255	221	476	22.2	277	202	479	21.1
TOTAL	1190	953	2143	100.0	1304	967	2271	100.0

Source: Tayside Structure Plan.

The problem of unemployment will continue for some time to come, especially for young people and school leavers, who find employment prospects getting worse and worse.

B.1.1.2. Industrial decline

There has been industrial decline, especially in the sectors of textiles and engineering. However, there has been an increase in the number of firms engaged in engineering and electronics also. The textile sector has run into problems because of competition from developing countries where labour production costs are lower. There has been some diversification in industrial production in some areas of Angus District. However, for Forfar, about 20% of the workforce is in the textile sector. Montrose, which has oil-related activities as major employer could be in the same danger in case the present oil boom ends, hence the need to widen its economic base. Kirriemuir has a narrow base economy, because it mainly depends on jute manufacturing (another declining industrial activity). Furthermore, Kirriemuir is just a dormitory town for Dundee and Forfar. The people go to these towns for employment and specialized services.

The magnitude of the problem of industrial decline can be seen clearly if one analyses the number of people employed in different industrial activities. This is in particular reference to the textile sector. The number of people employed in these sectors are also shown as percentage of total industrial employment. (Table B.1.1.2. a).

Table B.1.1.2. a Industrial Employment by Sectors and Towns 1980

	SIC	Forfar	Kirrimuir	Arbroath	Carnoustie	Montrose	Brechin	Total	%
Textile	13	1236	206	353			304	2099	23.8
Food,drink and tobacco	3	179			82	590	249	1100	12.5
Mechanical engineering	1,12	343		1590	163	111	438	2645	30.0
Timber and furniture	17	83	88					171	1.9
Chemicals and Chemicals Engineering	5		130			600		730	8.3
Paper Printing and Publishing	18			225				225	2.5
Clothing and Footwear	15			148	77			225	2.5
Coal and Pe- troleum Products	4					92		92	1.0
Brick,Pottery and Glass	16					68		68	0.7
Other		238	113	383	384	253	109	1480	16.8
TOTAL		2079	537	2699	706	1714	1100	8835	100.0

Source: Tayside Regional Council

The declining sector of textiles employs above 20 percent of the people in manufacturing and Forfar has the largest share. This shows that it is an unemployment prone area.

The number of employees in all the sectors (agriculture, industry and services) in Angus is 26,973. The principal sources of employment are services 13,246 (49.1%), manufacturing 8,513 (31.56%), agriculture 3,004 (11.30%) and construction 2210 (8.19%).

Table B.1.1.2(b) Employment in Angus Towns (Sectorwise) and the
Percentage of town employment to Total Employment
 (Figures in brackets are percentages)

Town	Manufacturing	Construction	Services	Total
Forfar	2079 (8.6)	334 (1.23)	3941 (14.6)	6354 (26.0)
Kirrimuir	537 (2.2)	207 (0.74)	435 (1.61)	1173 (4.89)
Arbroath	2699 (11.0)	501 (1.85)	4040(14.97)	7240 (30.2)
Carnoustie	706 (2.9)	157 (0.58)	498 (1.84)	1361 (5.0)
Montrose	1714 (7.0)	787 (2.91)	2340 (8.67)	4841 (20.2)
Brechin	1100 (4.5)	230 (0.85)	1992 (7.38)	3322 (13.85)
TOTAL	8835 (36.3)	2210 (8.19)	13246 (49.1)	24291 (100)

Source: Tayside Regional Council

Table B.1.1.2(b) above shows the number of employees in towns and their relative weight in the total Angus situation. We see that Arbroath employed 30.2% of the total employment force in Angus, followed by Forfar (26%) and Montrose (20.2%) etc.

Table B.1.1.2.(c) Employment in Planning Areas by Sectors as
Percentage of total employment in Angus District

Planning area	Manufacturing	Construction	Services	% of total people employed
Forfar/Kirriemuir	30.72%	24.20%	33.03%	32.79%
Arbroath/Carnoustie	36.21%	29.77%	34.25%	34.38%
Montrose/Brechin	33.05%	46.01%	32.70%	32.55%

Table B.1.1.2. c shows that the three planning areas in Angus have almost an equal amount of people (32%, 34%, 32%) employed, and their share in the different economic activities is almost equal. In services they have a more or less equal share, but in the construction the Montrose-Brechin are is heading. In manufacturing Arbroath and Carnoustie is ahead with 36.21%.

Table B.1.1.2. d Contribution of Individual towns to sectoral employment
in Angus (in percentages)

Town	Manufacturing	Construction	Services
Forfar	24.42	15.11	29.35
Kirriemuir	6.30	9.09	3.28
Arbroath	31.70	29.6	30.49
Carnoustie	4.51	7.10	3.75
Montrose	20.13	35.61	17.66
Brechin	12.92	10.40	15.03

Source: Tayside Regional Council

B.1.2. Development Policy

B.1.2.1. National Policy

Scotland like other economies of the world is experiencing economic recession. Furthermore, there is unemployment which is aggravated by the presence of declining industries - mainly textiles. The general policy is towards economic growth through industrialization. The government aim is to encourage private investment into Scotland and from UK and overseas.

There has been success in attracting foreign investment. The main foreign investors in industry come from USA and top the already existing factors of production in Scotland - mainly skilled labour with good working relations. In an effort to re-activate the economy, the Economic Planning Department has called for the increased supply of areas for large scale industry, food production, timber production, conservation of nature and recreation. However, developments which damage or destroy the quality of environment, will not normally be accepted. As such, the following issues are to be referred to the Secretary of State (a) large scale industrial developments (i.e. over 100 hectares) (b) small scale industrial developments in proposed industrial sites (c) Proposals requiring more than five hectares of A+, A and B+ agricultural land, (d) any development proposal affecting grade 1(one) and 2 (two) nature Conservation Council sites (e) development in the National Park direction areas and (f) certain development within preferred conservation zones on the coast. A large scale industrial development site, should be appropriate when

- a) it is near to areas where there is greatest need for new industrial employment.
- b) it has advantages to investors in terms of physical features, labour attachment or communication
- c) it does minimal damage to agricultural land, rural landscape and residential areas.

Under the Secretary of State, there are five departments - two of them are the Scottish Development Department (SDD) and the Scottish Economic Planning Department (SEPD), both of them with a common objective of promoting balanced growth and development in Scotland. The SEPD advises the Secretary of State on industrial and economic development in Scotland, while the SDD deals with land use, planning, housing, roads, water electricity and local government.

The Scottish Development Agency was set up in 1975 as the Government's principal means of regenerating Scottish Industry and promoting the development of the Scottish Economy as a whole. It is under the Office of the Secretary of State and provides loans, gives guarantees and subscribes equity or other shares in Companies. It also establishes new enterprises either alone or in partnership, constructs and lets factories both in advance of need or to particular requirements of specific needs. In deciding what rate of return on its industrial investment is appropriate, it has to take into account maintaining and safeguarding of employment, and fostering of development generally.

The Scottish Economic Planning Department and the Department of Industry offers financial assistance to all areas of expansion. The whole of Scotland is under this category. The Regional Development Grants are available for new industrial buildings and adaptability. Also it is available for new machinery and plants, except for intermediate areas. Selective assistance is available for manufacturing industry in all areas. Other government assistance includes loans on preferential terms (for projects that provide additional employment), interest relief grants and tax concessions. However, other sources of finance include EEC.

B. 1.2.2. Regional policy

The policies of the Regional Council as contained in the Regional Report of 1978 and the Structure Plan (1980)(1) are to "co-ordinate its efforts with the Districts Council and other agencies to create jobs, reduce unemployment and wherever possible to gain government and EEC assistance for Tayside",

- (2) to "promote Tayside as a location for industrial and Commercial Development, with a bias towards those activities which would fill gaps in the Regional economy,
- (3) to give particular priority to conserving the better quality agricultural lands"
- (4) to "pursue development control policies aimed at protecting environment and particularly those important wild life and plants habitats"
- (5) to "minimize pollution in Tayside"
- (6) to "ensure adequate supply of suitable premises for industry including the creation of advance".

The Regional Council recommends that

- (1) In Carnoustie an additional area extending to approximately 1.5 hectares be allocated for industrial purposes in the context of local plans and the supply maintained at 50 hectares thereafter.
- (2) Priority in investment in waterservices should be given to the removal of development constraints in Forfar and Montrose.
- (3) Creation of jobs in other sectors to fight unemployment.

At present, the whole of Tayside enjoys development area status, with special development area status in Dundee and Arbroath Employment Exchange areas. Changes in Government regional policy from 1982 will, however, leave Dundee and Arbroath as special Development Areas. The policy of the Regional Council concerning the distribution of additional industrial areas is as follows:

- (1) Arbroath and Carnoustie - 250 acres
- (2) Montrose/Brechin - 150 acres
- (3) Forfar/Kirriemuir - 150 acres

The Council also recommends that adequate provision should be made in local plans for the provision of small industrial sites and premises, particularly within the inner-city areas.

The Regional strategy for industry is to

- (1) (i) achieve the provision of an adequate number and range of job opportunities throughout the region.
 - (ii) ensure that sufficient serviceable land is made available for industrial and residential development.
 - (iii) obtain the maximum choice of location for development consistent with the use of infrastructural services.
 - (iv) to protect environment
- (2) ensure that adequate provision is made for industrial and residential development in at least one of the major settlements in each planning area of Tayside. In Angus District, priority is given to Arbroath, Forfar, and Montrose.

B.1.2.3. Major Sites Policy

The National Planning guidelines emphasize the importance of sites larger than 100 hectares. The development of such a major site, is an important contribution to the range of sites necessary to help reduce the current unemployment levels and also diversify the employment structure of the Dundee/Arbroath area. There are three major potential industrial sites for large scale development, one of them is Barry Buddon and is within Angus District. The other two are on the boundaries of the District and hence have thin effect on the District.

(1) Barry Buddon

The pressure from North Sea oil development led to the issue of National Planning Guidelines indicating where oil and gas related developments should take place, particularly in coastal locations. The guidelines indicated preferred development zones, namely areas with which sites for oil related developments seemed appropriate and should be encouraged and preferred conservation zones. The Structure Plan indicated a number of locations for the siting of major industrial developments (100 hectares) including Kinnaber (North of Montrose) and Barry Buddon.

The policy of Tayside Regional Council concerning Barry Buddon is given in the Regional Structure Plan - P. 6. "The Buddon peninsula be safeguarded for major industrial development. Application for Planning Consent which would result in a reduction of the distance between Buddon and the existing built-up areas of Carnoustie, Barry and Monifieth, shall not be in conformity with this Structure Plan". Barry Buddon site is on the coastal area between Monifieth and Carnoustie, ten miles from the centre of Dundee. The Ministry of Defence uses this land for training purposes and the area is of little agricultural value. The site is approximately 1,550 acres but east of the site are the golf courses at Carnoustie and these, along with the nature Conservation interests associated with the dune system, present major constraints to any industrial development on this peninsula.

(2) Errol

The Errol industrial site is located between Perth and Dundee and is mainly within the perimeter of a former wartime airfield. It is around 500 acres and is owned by four farmers. The land is mainly A class quality.

(3) Tealing

The Tealing industrial site lies 5 miles North of Dundee city centre and 9 miles South of Forfar. The site is 260 acres of which 200 acres are in agricultural use.

B. 1.3. Development Constraints

Generally speaking, industrialists would go to places where some minimum conditions have been met. Physical provision helps in facilitating industrial employment. However, in Angus District and elsewhere in Tayside Region, there is a shortage of both land and premises for industrial development. These factors have a double effect. They can attract new firms to come in or allow the existing ones to expand their activities .

Nevertheless, it is not only provision of land and premises , but the plots should be of the required standards. The size and location is also important.

The survey on the availability of land for industrial development shows that Carnoustie has 40 acres of land zoned for industrial development, but there is none immediately available, i.e. there is no spare capacity of serviced land. On the other hand, Arbroath has three immediately available sites - the biggest is 570 acres, followed by two small ones, 1.5 and 0.5 acres. There is therefore a need to service the 192 acres zoned for industrial development in Arbroath. Montrose has 130 acres for industrial development, but only 16 acres are immediately available. Brechin has 53 acres of zoned area, but only one acre is immediately available. In Forfar town, 70 acres have been zoned for industrial development, but only 12 acres can be of use now. Kirriemuir has no land immediately available for industrial development, although there are 40 acres of industrial zoned area. (See table B.1.0(6)).

There is therefore a shortage of industrial land which is serviced.

Furthermore, the land that is available is only in small plots, well below 100 acres, i.e. a constraint to large scale industrial plots. However, large scale plots may bring about land use conflicts, e.g. use of high quality agricultural land, for industrial development.

Another constraint is that of availability of water and sewerage services. Kirriemuir has a problem in its lack of spare capacity for sewage treatment. The existing one is overloaded and hence a need for a new plant. The water constraint exists in Montrose. As for sewage treatment, the situation is good, but the capacity of the pipes is very low . Generally there is a problem of shortage of water and sewerage services. Only Arbroath has a somewhat satisfactory condition as the table on the next page shows.

Table B.1.3.(a) Availability of Water and Sewerage Services

Town	Sewerage	Sewage treatment or disposal	Water Supply
Arbroath	Favourable in part only	Favourable in part only	Favourable
Brechin	Favourable	Not favourable	Not favourable
Carnoustie	Favourable in part only	Favourable	Not favourable
Kirriemuir	Marginal spare capacity	Not favourable	Favourable
Forfar	Favourable in part only	Favourable	Not favourable
Montrose	Favourable in part only	Favourable	Not favourable

Source: Extracts from Tayside Region Structure Plan.

Chapter II. Towards Priority Areas

B.2.1. Sectoral Methodological Approach

The employment figures available from the employment office are for 1977. Based on these, some assumptions had to be made in order to arrive at projections for the year 1980, which was chosen as the base year for the study. Information was gathered from people involved in the planning and industrial development of the area. Further information was obtained from industrial reports and studies undertaken for the District.

In some instances, figures for 1977 were adapted and considered relevant for 1980 also in order to minimize the number of assumptions which would be necessary.

B.2.2. Collection of Data - Existing and non-existing

In the process of data collection, some constraints were experienced since data on industrial output and government incentives were not available at district level, and were already 3 years old (1977). The local employment office boundaries are not coincident with those of the planning areas and the Montrose Local Employment Office. This has also caused considerable difficulties in data analysis. In addition to these pieces of information such as the total floor area of the different industrial sectors and information on number of employees per individual plant were not available. These constraints therefore reduced the contribution of the sector to the study in terms of homogeneity analysis.

B.2.3. Economic hierarchy

Table B.2.3(a) Economic hierarchy

Town	Manufacturing	Construction	Services	Percentage population ration	Industrial area available (serviced)
Forfar	4	3	4	12,81	3
Kirriemuir	1	1	1	6,5	1
Arbroath	5	4	5	25,03	5
Carnoustie	1	1	1	9,06	1
Montrose	3	5	3	12,19	3
Brechin	2	2	2	7,58	2
	↓	↓	↓		
	manufact.employees (town)	constr.empl. (town)	service empl. (town)		
	manufact.employees (Angus)	constr.empl. (Angus)	service empl. (Angus)		

The industrial sector working group contribution to the hierarchization of rural centres is given in table B. 2.3. (a).

Scores of 1 to 5 were given to the ratios found. The highest score 5, was given to positive ratios which lead to economic development and potential and 1 (one) was given to the less important centres in respect to the ratio discussed. The last column shows the potential industrial sites immediately available for development including energy, water, sewerage and physical access. There are two major levels of urban centres in Angus - Arbroath, Montrose and Forfar fall in the higher level and the other three towns in the second level.

The number of employees was used as an indicator of industrial development since, as mentioned earlier, the floor space and production (output) figures were not available at District level.

As for the level of industrialization and potential for development, the ratios between the town manufacturing employment and Angus manufacturing employment were calculated. The scores given to these ratios have a high correlation to the scores given to the industrial land available (serviced). Therefore, the final scores which were considered in the process of finding the hierarchy of centres and the potential for development are shown in table B.2.3(b) below.

Table B.2.3(b) Level of Industrialization

Town	Industrial level score
Arbroath	5
Forfar	4
Montrose	3
Brechin	2
Carnoustie	1

Chapter III Recommendations

B.3.1. Key Development Recommendations

1. Attracting labour intensive industries with a high employment-area ratio.
2. Examining the oil based industries carefully and approach it with caution to prevent the establishment of gas crackers with a low employment area ratio without the downstream industries which can contribute most to the economic development of the district. See B.3.2.
3. Preparation of a legal framework for the introduction of the Environmental Impact Report.
4. Widening of the industrial base of the district by attracting different sectors of manufacturing.
5. Special attention should be given to encourage the establishment of manufacturing companies with 50-150 employees in order to reduce dependency upon few big employers.
6. Launching an aggressive campaign to promote the establishment of few big industries in Barry Buddon especially goods producing companies with high area/employees ratio and strong multiplier effects.
7. Removal of the water and sewage constraints which prevent the development of new industrial sites.
8. There is a need to increase the range of sites available for large scale industrial development in order to increase the chances of attracting major new industry to the district.

B.3.2. Recommendations for further studies

- B.3.2.1 Which sectors in industry has the best conditions for development in Angus as far as manpower, technology and sites are available.
- B.3.2.2. What are the potentials of the individual large scale sites and what are the inputs required in order to make these sites available and serviceable for industrial development. Barry Buddon is a special case with high priority.
- B.3.2.3. What multiplier effect does each industrial sector has based on the existing local conditions.

B.3.2.1. The Chemical Industry

The largest employer in fine chemicals within the Tayside Region is at Montrose. Coastal locations are of particular significance to chemical industry which requires to import raw materials or expect processed in bulk. The distinction between petro- and chemical is blurred and to a large extent, the terms are interchangeable. The development of North Sea oilfields provides the first major opportunity for ethane based ethylene production in Europe. Ethylene is a basic building block for the petro-chemical industry, acting as a starting point for a "cluster" of plastic products. The N.G.L. cracker plants are basic to the development of downstream plants (plastic products). As the petro-chemical industry is seen as a major growth industry, its potential for employment is of particular interest. The employment potential is very much dependent upon the type of plant envisaged.

From table B.2.3 (c) it will be seen that the potential for job creation increases as the processes proceed in the down stream direction. The consumer industries are likely to create the greatest number of direct jobs with employment densities approaching 50% per hectare, but the land labour requirements tends to vary depending on the process used. The attraction of basic petro-chemical plants does not necessarily guarantee the attraction of crackers, and the attraction of crackers does not imply the location of down stream plants such as low density or high density ethylene plants. The attraction of processing or down stream plants does not imply the attraction of consumer industries. The Forth Estuary Study estimated that the employment multiplier would be between 1.1 to 1.2 per directly employed person.

B.2.3.(c) Employment/site area characteristics of various petrochemical plants

(Employment figures relating to plants only are merely indicative)

<u>Type of plant</u>	<u>Area required</u> (ha)	<u>Employment</u>	<u>Employment density</u>
<u>Basic hydrocarbons plants</u>			
Gas terminal	200	200	1.0
Primary gas separation	200	100-200	0.5-1.0
NGL plant	40	75	1.8
<u>Primary petrochemical plants</u>			
Cracker	40	300	7.5
Aromatic plants	10	120	12.0
Ammonia and Methanol plants	10	400	40.0
<u>Downstream petrochemical plants</u>			
LdPE plant	10	240	24.0
HdPE plant	10	200	20.0
Vinyl Chloride/Polyvinyl plants	150	500	3.3
Petrochemical complex	200	4000	20.0
<u>Consumer or finished goods plants</u>	Variable	Variable	could be 50.0

Downstream

Source: SDD "B" Series Planning Information Notes - Oil, Gas and Petrochemicals.

SECTORAL REPORT C

TOURISM
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Sectoral survey report: no.c:Tourism.Chapter 1 : The present situationIntroduction

The tourist industry has of late been subjected to research at both Regional and District levels. Research findings show that the sector is becoming a major growth industry. Thus, by the type of employment it creates, the sector is best suited for playing a supporting role in the economy, particularly by creating full or part-time job opportunities for women who would not otherwise be working.

The Angus District possesses a lot of tourist attractions- endowed with a landscape of great scenic beauty and value, lochs and mountains which attract tourists from all over the world. Given the increasing trend in tourism, especially towards Britain, the District and the Tayside region as a whole has a bright future in the tourist trade.

This sectoral report attempts to highlight some of the problems and constraints to the industry in the District. An attempt is also made to find out the sector's functional role in the urban and rural scenes. Variables from the sector have been used to delineate homogenous zones. Finally, an attempt has been made at drawing up priority areas and recommendations for further studies.

C.1.0 Present situation

Angus District contains a substantial part of the Region's tourist attractions in terms of the physical environment both rural and urban. A variety of scenery and wide range of recreational opportunities exist in the Highlands and along the coastal belt of the District. The urban centres have a wide variety of sporting and recreational facilities, e.g. the golf courses, sea-side resorts, and other indoor recreation facilities.

C.1.1.1. Demand for Tourism

With the world tourism continuing to increase at 4-5% per annum and Europe, including Britain, expecting 72% of this figure, Scotland is in a favourable location in terms of crude world trends, but needs a detail assessment in view of growing world competition. Evidence from the British Tourist Authority also points to strong possibilities of attracting more visitors from Sweden and Japan to Scotland.

A study based on "gravity-model" method to estimate the number of visitors at tourist points was made along the transportation network of the Angus District. The Survey included people engaged in various activities like walking, picknicking and fishing. Table C.1. shows the Distribution of the visitors per parish. These activities could be linked to 3 categories of recreational attractions:

- (i) User oriented areas close to hand
 - (ii) Intermediate use areas for day long and weekend recreation
 - (iii) Resource-based areas which draw holiday makers long distance.
- All these 3 categories are available in the District and continue to attract more visitors.

C.1.1.2. Supply of Tourist Resources

After considering the demand situation, it is necessary to see the other side of the equation so as to know the tourist capacity of the Angus District, and its ability to attract people. Five elements are considered to be of key importance at the supply side:

- (i) Accomodation (to date they key measure of tourist capacity)
- (ii) Transportation and Accessibility (to and from the District)
- (iii) Extrinsic and intrinsic recreation resources
- (iv) The generation of business, conference, educational and related visits facilities for these functions.

- (v) The pull of families, friends and domestic means of accomodating such visits.

Whilst it is not intended to discuss these elements, a brief note on accomodation is necessary. In all tourist strategies, accomodation takes a major place.

However, the actual and potential demand for recreation (leisure) and for tourism is concentrated in urban areas. In planning terms, therefore, the primary tourist resource both for consolidation as well as expansion, must be urban provision where economies of scale manifest the highest results. A strategy aimed at dealing first with the significant urban potentials before attacking the rural and spatially extensive resources is necessary.

C.1.2. Development Problems

The problems in this sector are mainly environmental in nature and have drastic effect on the development of the industry. This is because the environment is a potential resource for the industry.

The problems include:

- (i) Pressure on car parks, picnic sites and access to land, especially by car owners.
- (ii) High volumes of traffic, especially the single tracks up of to the glens.
- (iii) Increasing wild camping - resulting from tourist traffic into the wilderness, thus endangering the visual ameneties of the environment.
- (iv) Coastal erosion is considered to be a big problem between Broughty Ferry and Montrose.
- (v) The Glens, especially Glen Clova is a problem area, suffering from the activities of wild campers.
- (vi) High variation in the occupancy rate of tourist or hotel accomodation.
- (vii) Lack of transport service to the Glens for the benefit of non-car owners to patronise the industry.
- (viii) Pollution of the Loch resulting from poor provision for effluents disposal, thus altering the oxygen demand of the river resulting in a permanent disturbance of the ecology of the area.

C.1.3. Development Policies

Despite the relatively low priority given by planners to this all important industry; there are positive policies aimed at protecting the environment as well as creating more opportunities for holiday-makers. Hence, policies have been formulated to protect the natural amenities of the rural areas. Under the policy, certain areas have been designated areas of restricted development, preferred development zones for caravan sites, tourist routes, and water sports areas of scenic or recreational interest. Certain schemes have also been approved for the highlands. In the local plans, the urban centres have their specific policies and programmes for the development of recreation and tourism.

C.1.4. Development impediments/Constraints

C.1.4.1. Economic Atmosphere

The state of the national and the international economy affects the industry. Currency rates and unemployment from 2 factors which tend to act as constraints to the development of the sector. The persistence of unemployment in the economy (due to world-wide economic recession) continues to bother planners. The increasing unemployment indicates a decreasing real disposable income, hence decreased demand for serviced type of accomodation which provides much of the income generated from tourism.

C.1.4.2. Development funds

The reduction on public expenditure due to the unfavourable economic situation has left very little for the provision of adequate amenities for the development of tourism. This is a major constraint to the development of tourism, as the priority of the local authorities gets shifted towards solving the immediate problems of housing, unemployment, industrial sites, social welfare, road infrastructure, etc. The local authorities are further constrained by policy on the amount of expenditure allowed for the provision of amenities for tourist promotion - a total of 15% of the income may only be allowed for expenditure.

C.1.4.3. Environmental Protection

Policies towards preservation of the environment tend to act as constraints to the development of tourism; although some of the policies rather help to enhance the natural and scenic value of the areas concerned.

C.1.4.4. Institutions

The sector appears to be over-burdened by the number of institutions involved in its development. Effective cohesion in decision making on development issues becomes difficult. For instance, the Forestry Commission is responsible for providing facilities for camping, caravan sites, fishing etc. Private agencies and pressure groups, voluntary organisations - all made decisions which become constraints to the development of the industry. Regional, District and/or Local Councils are to service the industry, whilst the British Tourist Authority and the Scottish Tourist Boards assume the responsibility of promoting regional and national sales respectively. This institutional arrangement appears to contribute to "mixed-decision making" and points to the need for an effective inter-agency co-operation and coordination.

CHAPTER IITowards Priority AreasC.2.1. Sectoral Methodological Approach

In order to arrive at the ultimate goal of hierarchy of centres and priority areas, the spatial distribution of tourist resources was investigated. Indicators showing the attraction of and facilities available at the parish level for tourist development were to be applied in the study. These indicators were to be subjected to factor analysis or classified into 5 groups, scored and a coloured map of these scores produced. The facilities available in the area were also to be classified and scored for the central places analysis.

C.2.2. Collection of data

Statistical data were to be collected on the tourist arrivals, employment in the tourist industry (especially hotels), the number of hotels with their maximum capacity for beds, per capita income derived from the tourist trade. Data on the numbers of the facilities per parish was also desired.

C.2.2.1. Data availability (Existing and non-existing)

Due to the low priority given to the trade, tourist statistics are just not existent at the parish level. The available data are at Regional or National level in aggregate form. Thus of all the information needed, only the present tourist accommodation as well as the number of hotel beds were available. The number of hotel beds and the type of accommodation facilities, became the only two indicators - one for homogeneity and the other for hierarchization of central places.

C.2.3. Contributing Variables to Homogeneity Analysis

The number of hotel beds was estimated from the number of hotels and their number of bedrooms. No further construction of the number of hotel beds was made because the tourist population could not be obtained. A bed to population (including tourist) ratio would have been a good indicator which incorporates growth and distributive goals of development, the absolute number of hotel beds was therefore used to discriminate

the parishes into homogeneous zones.

C.2.4. Contributing variables to Hierarchization

The available number of facilities for tourist accomodation was calculated per parish. This includes hotels, self-catering accomodation, and caravan sites. The distribution of these facilities was supplied to the Rural/Urban Planning for the hierarchization of the centres.

C.2.5. Data Analysis for Homogeneity and Hierarchization

C.2.5.1. Homogeneity Analysis

From the spread of the total number of beds per parish, a classification of the data was made into 5 classes depending on the clustering of the spread (i.e. not necessary class intervals).

The five classes were then scored with the class containing higher units getting a score of 5 and that with the lower units scoring 1. The rationale behind this scoring is that, following the development goal of economic growth, the higher the number of hotel beds available per parish, the more favourable the area would be for economic growth through the development of tourism.

C.2.5.2. Hierarchization

For the hierarchization of urban and rural centres, the presence of hotels, self-service accomodation, and caravan berths were used. Due to the relative importance of each of these facilities in the economy of the District, the presence of hotels received more weight or score than the presence of caravans.

These facilities were therefore classified and supplied for the analysis of the Urban and Rural Centres.

CHAPTER II Towards Priority Areas

C.2.1. Sectoral Methodological Approach

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Chapter III

Sectoral Recommendation

In view of the relative importance of the urban centres as compared with the rural centres in respect of tourism, it is recommended that a strategy be aimed at dealing with the significant potentials of the rural and spatially extensive resources.

It is also recommended that a pre-feasibility study be undertaken to establish the profitability of providing the District (especially Angus Glens and Coast with facilities like public toilets, map and information boards, and car parks at various tourist points.

A further study is also recommended for establishing the District's capability to absorbing considerable numbers of tourists without becoming overcrowded.

It is also recommended that further studies should include the possibility of organizing day-excursion trips into the glens to cater for those without cars, who are at present unconsciously effectively debarred from exploring the area.

- C.2.5. Rescobie, Aberlemno, Kinnell, Farnee are to be further investigated and their tourist potential identified.

Table C.1.

TOURIST/RECREATIONAL STATISTICS

TOURIST ACCOMODATION

10-11-2

		1) Hotel Accomodation						2) Self-Catering						3) Caravan						Tourist (persons cars) Distribution by activity					
No.	Parish	No.	Rooms	Beds	No.	Rooms	Beds	Sites	Besths	Total Beds	Score	IS	W	P	C	F	Total								
21	Barry	21	250	299	2	2	6	6	42	305	5		0	0	0	840	840								
32	Monikie												27	0	0	0	27								
23	Panbride	2	6	13	1	1	4			17	4		0	264	0		264								
24	Arbirlot	1	4	9						9	3		0	0	0	129	129								
25	Arbroath & Vigeans	40	229	510	7	12	31			541	5		50	0	0	1797	1847								
26	Carmyllie												0	111	0	0	111								
215	Kirkden	1	7	17	2	4	10	1	8	40	5			4	0	0	4								
216	Inverkeilor	1	8	18	2	4	11	1	5	29	4		2	40	0	0	42								
217	Lunan												0	0	0	681	681								
218	Kinnell												0	44	0	0	44								
25	Maryton																								
26	Craig												93	0	0	78	171								
27	Dun												0	0	0	3	3								

28	Montrose	21	172	382	4	8	16	11	58	398	5	0	0	1400	0	1400
423	Farnell				3	4	12	1	8	12	4					
424	Brechin	2	4	8						8	3		15	0	0	15
429	Logie Pert	1	2	6						6	2					
430	Stracathro											24	0	0	0	24
431	Edzell	6	63	150				1	6	150	5	200	1640	0	0	1840
432	Careston				1	2	6			6	2	0	16	0	0	16
440	Menmuir				1	2	4			4	1	0	24	0	0	24
441	Lethnot & Navar											88	0	0	88	176
442	Loch Lee				1	2	5			5	2	0	616	0	0	616
57	Inverarity				1	2	5			5	2	18	0	0	0	318
58	Glamis	1	3	8						8	3	12	120			132
59	Newtyle															
510	Eassie/ Nevay															
511	Kinnettles	1	2	6						6	2	12	3	0	0	15
512	Airlie				1	2	5	1	3	85	2					
513	Kirriemuir	8	24	57				1	4	57	5	0	100	0	0	100

514	Forfar	4	17	33	4	9	18	1	6	51	5	0	0	9	0	9
519	Guthrie											2	0	0	0	2
521	Oathlaw											12	0	0	0	12
522	Aberlemno	3	8	19						19	4	0	48	0	0	48
523	Tannadice											12	0	0	0	12
534	Cortachy Clova	1	4	7						7	3	177	725		6	208
535	Kingoldrum															
536	Linthrathen															
537	Glenisla	1	6	13						13	4	40	132	52	0	224
538	Fern											0	108	0	0	108
539	Ruthven															
543	Dunnichen	1	2	3	1	2	6	1	4	9	3	15	0	0	0	15
	ANGUS	116	811	1558	33	60	149	25	144	1707						

Classification and scoring of hotel beds

4 = 1

5 - 6 = 2

7 - 10 = 3

11 - 30 = 4

31 = 5

- 1) Hotels, Guesthouses - Private Houses with Bed and Breakfast
- 2) Accomodation with 1 week let period - without Bed and Breakfast
- 3) Indicate the number of caravan sites and the maximum number of berths per parish

Source: Extracted from the Accomodation Register 1981

Parks, Recreation and Tourism Service, Angus

District Council, Arbroath

SECTORAL REPORT D

DEMOGRAPHY

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SECTOR D. DEMOGRAPHYD.1. Present situationD.1.0. Existing Situation and Trends

The population of the Angus District was estimated at 91,970 in 1980 with about three-quarters clustered in the six burghs and the rest scattered in the landward areas. Between 1960 and 1970, the population of the district decreased by over 4,000 after which it rose annually showing a growth of 6.2% between 1971 and 1976. However, between 1976-77 there was a decrease in the level of population increase, the increase for that year being only 220. But in 1977-78 there was a substantial increase of 2023.

The population change has not been evenly spread within the district. Arbroath, Carnoustie and Kirriemuir showed increases during the period of decline while Montrose and the landward areas recorded substantial losses. During 1971-74 all the town populations showed increases while the landward areas remained static.

The change in population due to natural causes is not significant in Angus. The average natural increase of 280 per year dropped to 45 between 1971 and 1976. After 1976, however, on the average a balance has been maintained. Migration has been the main factor in population change in Angus for many years. Before 1971, outmigration exceeded natural increase causing population decline. Since the 1970's, however, the situation has been reversed with substantial numbers of people moving into Angus.

D.1.1. Development problems

The problems posed by population are those arising from the needs of the population as they relate to housing, employment and services. The total number of persons over retirement age in Angus has increased from 16.8% in 1961 to 18.9% in 1976. Coupled with this is the decreasing average household size of 3.13 persons in 1961 to 2.86 in 1971 and to the current estimate of 2.7. This means substantial demand for more houses.

The average annual inward migration between 1971 to 1976 was 966 but when 1977-78 is included, a figure of more than 1,100 is calculated. This means pressure on the housing requirements and demand for more employment. About one quarter of the population of Angus lives in settlements of less than 1,000 people scattered in the landward areas. The problem of rural depopulation is a major factor in the reduced level of services now available in many rural areas.

D.1.2. Development Policies

Within the framework established by the population projections and the aims and objectives of the Regional Council, a Settlement Policy for Tayside has been prepared in which an indication is given of the scale of development in each of the burghs and the landward areas of the district. For Angus, a population of 95,000 has been indicated for 1986. Settlements, in general, should not increase their population more than 50% in any ten year period. Levels of development should be generally consistent with the main principals of the Tayside Structure Plan, and development prospects locally considering present services situation and the competing needs of business and housing.

D.1.3. Development Impediments

The availability of up-to-date population data is an important factor in this demographic study because it provides a base for other sectoral data analyses. Most of the data requirements were provided by the computer print-out containing the 1971 census figures and the population estimates of the Tayside Regional Council. However, the data were not available in the form required for the study. Therefore data processing was necessary to bring it up-to-date and in the form required for this study. Thus population estimates for the parishes were made assuming different annual growth rates. The handicap in relying on an old data base which is not in the required form is that it gives room for assumptions which may result in an inaccurate presentation of the actual situation.

In making the 1980 population estimates, annual growth rates were estimated from the 1971 census figures and the 1980 Tayside Regional Council estimates. See Table D.2.2.a. On the assumption that these estimated annual growth rates were the same for the parishes within the respective planning areas, the same were applied to the 1971 population figures of the parishes within the respective planning areas. It was also assumed that Carnoustie falls entirely within the parish of Barry even though part of it falls within Panbride.

There were discrepancies in the population estimates provided from the different sources. In Table D.2.2.a., the 1980 population estimate by the Tayside Regional Council for Angus District was 91,525, while the estimate of the Registrar-General's Office for the same year was 91,790. In the Angus District Council's Housing Plans and Programmes 1981/1985 the estimate for the same year was 91,970 and this was adopted in this report.

Chapter D.2.

D.2. Towards Priority Areas

D.2.1. Sectoral Methodological Approach

The sectoral study for demography and housing has been carried out jointly in various stages namely, preparatory, data collection, data analysis and reporting stages. The introductory lectures and the various reports on Tayside Region made available at the initial stage gave an insight into the study area and notes were taken of the relevant data available concerning demography and housing. The tour of the study area provided an opportunity of familiarizing with the area and provided a base for understanding the development issues of the area. Most of the data collection was carried out in Scotland. The data on demography and housing were available from the Tayside Regional Council, the Angus District Council and the SSHA. The analysis of the data to arrive at the variables required was carried out in Dundee. Population estimates were made for the parishes and population density per parish was derived from the estimates and the area of parishes provided. This variable formed an input in the homogeneity analysis.

The housing data were available for the burghs and the landward areas only. The number of people per dwelling unit was calculated for the six burghs and landward areas (See Table D.2.1.a.). However, this variable did not discriminate enough, therefore it was not used. The number of dwelling units per hectare was also calculated, but this variable was also not used, because the distribution was extremely uneven, comparing the burghs and the landward areas. An analysis of housing growth in relation to population growth for the urban settlements for 1977-80 provides a clear differentiation, therefore, this variable contributed to the hierarchization analysis. However, this variable when related to economic activity, showed an inverse correlation in the scores. * Table D.2.1.b. Not all the information requirements were obtained because of data inavailability. Data collection and analysis for demography and housing was carried out together, however, for the report on Housing. See Sector E.

Table D.2.1.a. Number of People per Dwelling Unit

Burghs and Planning Areas (Landward)	Population 1980	No. of dwelling units (1980)	No. of people per dwelling unit
Arbroath	22921	9022	2.5
Carnoustie	8299	3475	2.4
Forfar	11732	4875	2.4
Kirriemuir	4957	2177	2.3
Montrose	11166	4795	2.3
Brechin	7193	3157	2.3
Arbroath/Carnoustie Planning Area Landward	7528	2880	2.6
Forfar/Kirriemuir Planning Area Landward	10224	4204	2.4
Montrose/Brechin Planning Area Landward	7525	2715	2.8

Source: Population Tayside Regional Council

Dwelling units- Regional Assessor: Valuation Roll

TABLE D.2.1.b.

Housing growth in Relation to Population Growth

Burgh I	Dwelling units			Population			Economic activity			
	1977 II	1980 III	% change IV	1977 V	1980 VI	% change	IX VII VIII	Score IX	% of employ	Score
Arbroath	9197	9022	- 1.9	22661	22921	1.15	- 1.26	1	30.2	5
Forfar	4816	4875	1.2	11833	11732	-0.85	- 1.4	1	26.5	4
Montrose	4607	4795	4.1	10708	11166	4.2	0.97	2	20.19	3
Carnoustie	3255	3475	6.8	7860	8299	5.6	1.2	3	4.33	1
Kirriemuir	2038	2177	6.8	4791	4957	3.5	1.9	4	4.89	1
Brechin	2905	3157	8.7	7115	7193	1.09	8.2	5	13.85	2

Source: Population - Tayside Regional Council

Housing - Regional Assessor - Valuation Roll.

D.2.2. Collection of Data, existing and non-existing

The data requirements for the purpose of this demographic study include the present population of the Angus District, the parishes and the settlements, the annual growth rate, the area of each parish and the birth and death rates.

The existing data was the 1971 population contained in the computer print-out of the Registrar-General's Office. This gives the population of parishes within the district. Population estimates for Angus, the burghs and the landward areas up to 1980 were available from the Tayside Regional Council. See Table D.2.2.a. The 1975 population of the rural settlements was obtained from the Angus District Council. The area of the parishes was available from the computer print-out. The birth and death rates of Angus were provided by the Tayside Regional Council from the Registrar-General's office.

The non-existing data basically were the annual growth rate of the parishes. See Table D.2.2.a. and Chapter D.1.3. for the assumptions.

2.3. Data Analysis for Homogeneity and Hierarchization

The annual growth rates of the parishes were derived from population estimates made by the Tayside Regional Council for urban and landward areas. These growth rates were applied to the 1971 population of parishes within their respective planning zone to arrive at the 1980 population estimates. Hence the population density (i.e. people/ha) for each parish was obtained. See Table D.2.3.a.

Similarly, the projected population for 1980 was derived for the rural centres by rising their existing 1975 population and the annual growth rate of the parish to which they belong. These data were required by the Rural Centres Sector. The product of the data analysis was used in arriving at homogenous areas as shown in Table D.2.3.a. and figure D.2.3.a. and the ranking of rural centres by the Rural Centre Sector.

For urban centre hierarchization, the population density of the urban parishes has been used. See Table D.2.5.a.

TABLE D.2.2.a. Population - Angus District, Burghs and Landward Areas

	Census 1971	Tayside 1974	Tayside 1975	Tayside 1977	Tayside 1978	Tayside 1979	Tayside 1980	Estimated annual growth rate
Arbroath	22586	22704	22838	22661	22843	22805	22921	1.6
Carnoustie	6232	7579	7561	7860	8114	8282	8299	3.7
Forfar	10499	11412	11798	11833	11894	11826	11732	1.3
Kirriemuir	4138	4360	4597	4791	4939	4985	4957	2.2
Montrose	9959	10220	10290	10708	11110	11213	11166	1.3
* Brechin	7500						7193	-0.45
Landward								
Arbroath/Carnoustie PA	6408	6454	6521	7296	7610	7403	7528	1.9
Forfar/Kirriemuir PA	10301	10058	10129	10240	10301	10195	10224	-0.08
Brechin PA	4164	3989	3907	3819	3854	3866	3823	-0.91
Montrose PA	3313	3451	3512	3588	3890	3841	3700	1.3
Angus District (total)	84178	86972	87931	89710	91721	91615	91525	0.97
RG								

1) 1971 Census of Population and Households
Source: 2) 1974-80 Tayside Regional Council
3) Registrar General for Scotland

TABLE 2.3.a. Population density by parishes

Parish	Pop.estimate 1980	Area in "000" ha	No. of people per ha.	Score
Montrose	11166	1.8	6.2	5
Arbroath	24373	5.1	4.7	5
Forfar	13435	3.4	3.9	5
Barry	8299	2.1	3.8	5
Brechin	7193	5.6	1.3	5
Kirriemuir	6082	6.1	1.0	5
Craig	1245	1.7	0.72	4
Panbride	1736	2.5	0.70	4
Dunnichen	1135	1.7	0.67	4
Newtyle	844	2.1	0.41	4
Kirkden	858	2.2	0.39	4
Stracathro	736	2.1	0.35	4
Dunn	270	0.85	0.32	4
Monikie	868	3.6	0.24	3
Logie Pert	550	2.3	0.24	3
Kinnell	608	2.8	0.22	3
Arbirlot	588	2.7	0.21	3
Lunan	268	1.1	0.21	3
Inverkeilor	719	4.1	0.17	2
Guthrie	196	1.1	0.17	2
Maryton	135	0.8	0.17	2
Eassie/Nevay	336	2.0	0.16	2
Careston	140	0.85	0.16	2
Kinnettles	203	1.25	0.16	2
Rescobie	374	2.5	0.15	2
Carmyllie	446	3.0	0.15	2
Oathlaw	298	2.2	0.14	2
Airlie	476	3.6	0.13	2
Farnell	302	2.3	0.13	2

Table D.2.3.a. continued

9

Parish	Pop. estimate 1980	Area in "000" ha	No. of people per ha.	Score
Fern	471	3.5	0.13	2
Aberlemno	467	3.6	0.13	2
Cortachy/ Clova	317	2.5	0.13	2
Glamis	660	5.6	0.11	2
Edzell	803	7.6	0.11	2
Menmuir	400	4.3	0.09	1
Lethnot/ Navar	100	10.7	0.01	1
Loch Lee	128	23.6	0.05	1
Inverarity	501	4.5	0.01	1
Tannadice	598	8.6	0.07	1
Kingoldrum	212	3.9	0.05	1
Linthrathen	317	9.0	0.04	1
Glenisla	332	16.7	0.02	1
Ruthven	126	9.4	0.01	1

D.2.4. Contributing Variables to Homogeneity

For the purpose of arriving at homogenous zones, the parishes have been grouped according to ranges of their population density. Five groups have been distinguished as shown in Fig. D.2.3.a. Areas of potential growth can be seen as parishes with density of over 1 person per hectare. These attract high score from the economic point of view, because of the availability of labour. The six main burghs are in this category. However, the less densely populated areas are scored low because they are areas of least potential growth on account of labour availability. The homogenous zones derived from this variable provide an important base in this survey. This variable can be combined with variables in other sectors in arriving at either zones with potential economic growth, or zones with impediments to development.

D.2.5. Contributing Variables for Hierarchization

In arriving at an urban centre hierarchy the population density of the six urban parishes were used. These were grouped into five with the highest Montrose 6.2. persons/ha and the lowest Kirriemuir, showing 1.0 persons/ha. These were scored with the highest score of 5 corresponding to the most densely populated area being the area of highest potential growth, due to labour availability. See Table D.2.5.a.

D.3. Sectoral Recommendations

With the proportion of old population of Angus increasing, this category should be thoroughly studied and adequate provision made for them in terms of housing and infrastructural services.

TABLE D.2.5.a. Variable for Hierarchization - Population Density of Urban Parishes.

Urban Parish	Population density	Score
Arbroath	4.7	4
Barry, ie. Carnoustie	3.8	3
Forfar	3.9	3
Kirrimuir	1.0	1
Montrose	6.2	5
Brechin	1.3	2

SECTORAL REPORT E

HOUSING

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E.1. Present Situation

E.1.0.1.

Houses are one source of information about man and his activities in his habitat. The housing types give a first impression of a population, its income, density and distribution in a given area.

E.1.0.2. The Housing Stock and Distribution

The total effective housing stock in Angus is distributed in six main urban areas within the district, three planning areas and the landward areas. The total stock in 1980 was distributed among the different areas as follows:

Table E.1. Housing stock and Distribution

Urban areas	Stock 1979	% of total	Stock 1980	% of total
Arbroath	8959	23.6	9022	24.2
Carnoustie	3396	9.3	3475	9.3
Forfar	4864	13.2	4875	13.1
Kirriemuir	2140	5.9	2177	5.8
Brechin	3127	8.5	3157	8.5
Montrose	4785	12.9	4795	12.9
<u>Planning/Landward areas</u>				
Arbroath/Carnoustie	2855	7.9	2880	7.7
Forfar/Kirriemuir	4188	11.4	4204	11.3
Brechin/Montrose	2680	7.3	2715	7.3
=====				
Total Angus District	36994	100	37300	100

The total housing stock within the district has increased by 3072 dwelling units since 1976. During the same period, the population rose by 3,800 clearly illustrating that house building is not directly related to the population growth. The housing tenure in Angus in 1979/80 for the main urban areas and the landward was as follows:

Table E.2. Location and Tenure Split

Tenure	P.S.	O.O.	P.R.	Total	%
Arbroath	5532	2890	537	8959	24.2
Brechin	1813	988	326	3127	8.5
Carnoustie	1391	1866	139	3396	9.2
Forfar	3151	1445	268	4864	13.2
Kirriemuir	978	1006	156	2140	5.8
Montrose	2337	1983	465	4785	12.9
Landward	1846	5105	2772	9723	26.2
Total	17084	15283	4663	36994	100
Percentage	46.1	41.3	12.6	100	

Source: Regional Assessor's Records - Angus Division - June 1979
(Angus District Housing Plans and Programmes 1980/1-1984/5)

P.S. - Public Sector

O.O. - Owner Occupied

P.R. - Privately Rented

As can be seen in table E.2, the largest proportion of the housing stock (46,1%) lies within the public sector. This figure is slightly higher than the United Kingdom average, but lower than the figure for Scotland.

Table E.3. Housing tenure Angus District/Scotland/U.K.

Place	Year	O.O.	P.S.	P.R.
Angus	1979	41%	46%	13%
U.K.	1977	54%	32%	14%
Scotland	1978	34%	54%	12%

O.O. Owner Occupied

P.S. Public Sector

P.R. Privately rented

E.1.0.3. The Housing Condition

Approximately 2140 dwellings in Angus are below the tolerable standard, and of these 1700 are still occupied; these are located as follows:

Arbroath	550	25.7%
Brechin	134	6.3%
Carnoustie	96	4.5%
Forfar	129	6.0%
Kirrimuir	109	5.1%
Montrose	368	17.2%
Landward area	753	35.2%
Total	<u>2139</u>	

Source: Regional Assessor's Records (June 1979)

Angus District Council Housing Plans and Programs 1980/81 - 1984/85

The total of 2,139 sub-tolerable dwelling units in Angus, represents less than 6% of the total housing stock.

The number of the sub-tolerable houses has been steadily reduced as private individuals increase their utilization of improvement grants.

The Scottish Special Housing Authority have also been active in rehabilitation projects.

E.1.0.4. House Sizes and Dwelling Density

The present situation of house sizes is important, as it should be clear how well the housing stock meets the space requirements of the household within the district.

By comparing the size of houses constituting the total stock in 1980 with the size of households, there appeared to be a substantial over-provision of 3 or more apartment houses, and a real shortfall in small dwelling units.

Table E.4. Size distribution of SSHA Houses in Scotland/Angus

Size of dwelling unit	% of distribution in Scotland	% of distribution in Angus
1-2 rooms	6	10
3 "	40	35
4 "	46	41
5-7 "	8	14

Source: SSHA Angus District Planning Dept.

In the public sector, the local Authority can easily control the size of households occupying any particular dwelling unit size. As to that, the over-crowding that was 3.8% of the dwelling-units in 1975, decreased to zero in 1980 after the District Council took action.

The average population density per dwelling unit in 1980 was 2.6 people/dwelling-unit. The figures for the different areas in Angus are as follows :

Arbroath	2.7	People/dwelling unit			
Carnoustie	2.4	"	/	"	"
Forfar	2.7	"	/	"	"
Kirriemuir	2.8	"	/	"	"
Montrose	2.3	"	/	"	"
Brechin	2.3	"	/	"	"
Arbroath/Carnoustie P.A.	2.61	"	/	"	"
Forfar/Kirriemuir P.A.	2.43	"	/	"	"
Montrose/Brechin P.A.	3.0	"	/	"	"

Source:

E.1.1. Development Problems

E.1.1.1. Land Bank Problems

There will be a need for the provision of more housing land around the urban centers in Angus as these are the main expanding areas in the district.

Residential development in Arbroath, Carnoustie, Montrose and Brechin is limited, since these places have almost reached the line of their municipal boundaries. Expansion therefore means the taking over of agricultural land in the urban fringes.

In these urban areas, no further residential land will be allocated unless a clear need can be identified which cannot be met within the existing zoned areas.

E.1.1.2. Availability of Finance

The finance made available to Housing Authorities has been substantially reduced for 1980/1 and 1981/2. The unhealthy financial situation of the U.K. calls for the assumption that the situation will not improve in the next 3 years.

E.1.2. Development Policies

E.1.2.1. Central Government Policies

Successive governments have advocated home ownership policies, but in effect have done very little to enable these aims to be achieved. The present government is further cutting public expenditure, and there is no reason to believe that housing infrastructure will be exempt. Accordingly serviced land for private and public sector housing will become even scarcer, leading to further price increases and an inability to meet demand.

Towards the public sector alone, the government policies can be much more variable than towards the private sector. However, it would seem reasonably safe to assume that the private sector and home ownership will be afforded priority over further public expenditure on housing for rent.

E.1.1.2. Regional Policies

The Tayside Regional Council states that it will plan for nil net migration across the region as a whole. Because of natural increase and the probability of Dundee continuing to lose population, this would still lead to the population of Angus increasing, but at a much slower rate than has been experienced since 1971. The priority and finance provided by the Regional Council for water services infrastructure will, because of the current widespread shortage of serviced sites within the district, be a major factor in determining the location and quantity of public sector houses which can be erected in the next 5 years.

E.1.3. Development Impediments

E.1.3.1. Water and Sewerage

Tayside Regional Council in general, and Angus District Council in particular, have inherited a situation whereby infrastructure in the form of sewerage, sewage works and water pipes are outdated, used to over-capacity, or are simply non-existent because central government has not provided the finance for that infrastructure.

As an outcome, zoned land areas for new housing sites cannot be developed (and thus added to the land bank problems) in the urban areas because of the lack of infrastructure.

In Montrose, for example, no planning consent for further housing will be granted except in exceptional cases) until the water supply is satisfactorily augmented.

Chapter 2 Towards Priority Areas

E.2.1. Sectoral Methodological Approach

See sectoral report D (Demography) contributing towards the homogeneity exercise.

E.2.2. Collection of data

See page 11 here.

E.2.3. Contributing variables to hierarchization

E.2.2.1. Dwelling Units Density per hectare

This variable discriminates clearly between the different types of areas in Angus - urban areas and landward areas.

Within the areas, this variable gives an inner hierarchy by determining the density as follows:

Table E.5. Density of dwelling units/ha Angus District

Area	No. of dwellings units/ha
Arbroath	1.8
Carnoustie	1.4
Forfar	1.5
Kirriemuir	0.3
Montrose	2.3
Brechin	0.1
Arbroath/Carnoustie	0.03
Forfar/Kirriemuir	0.02
Montrose/Brechin	0.1
Average Angus District	0.9

E.2.2.2. Housing Growth Related to Population Growth Rate

Another variable which gives a clear discrimination between the different urban areas, and therefore contributes to the hierarchization, is the rate (in percentage) of the housing growth versus the population growth rate as can be seen in Table D.2.1.b. of Sectoral Report D.

E.2.2. Data collecting

E.2.2.1. Population data

For population data used in this sector see sector D Demography.

E.2.3.2. Housing data

The housing data were collected from three main sources:

- a) Tayside Regional Council - General figures on Angus District housing
- b) Scottish Special Housing Authority (SSHA) -
Data on the public sector housing types and figures
- c) Angus District Council Housing Department -
Refined data on all housing types and stock within the district.
The non existing data, like the housing annual growth rates, were calculated from the given information.

Chapter 3 Sectoral Recommendations and suggested
 Pre-Feasibility Study

3.1. Sectoral Recommendations

- a) The removal of sewerage and water supply constraints so that development plans can proceed smoothly.
- b) By comparing housing supply and industrial development in urban centres, the industrially higher ranking towns had a lower degree of housing supply and a high demand for housing.
Therefore, those centres should be given higher priority in future plans, i.e. Arbroath and Montrose.
- c) Private construction should be encouraged in order to reduce the pressure of the long waiting list for the public sector housing.

3.2. Suggested Pre-Feasibility Study

Searching for possible new development sites, outside of the present urban boundaries.

SECTORAL REPORT F

HEALTH

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Chapter 11.0. Present Situation

The Tayside Health Board is responsible for Health Services in the Tayside Region. Generally, a broad range of hospitals and health services is provided at the 30th September, 1976. The bed complement in terms of number and rate per thousand population was as follows for Tayside Region and the Angus District.

Table F. 1.0.a. Bed Complement - Number and rates per 1000 population as at 30th September 1976 - Tayside Region and Angus District

	Acute	Psychiatric	Geriatric	MD	Obstetric	Other	Total
Tayside							
Number	1749	1741	866	690	255	576	5877
Rate	4.4	4.3	2.2	1.7	0.6	1.4	14.6
Angus District							
Number	435	601	244	-	55	30	1365
Rate	4.8	6.7	2.7	-	0.6	0.3	15.2

Population used: Registrar General Mid-Year estimates for 1976.

Source: Tayside Regional Health Board.

The general level of hospital bed provision for both Tayside and Angus is much higher than the Scottish rate of 3.9 and has also been reported higher than the U.K. rate. Most of the health facilities and manpower in Angus District are concentrated in the major urban centers of Montrose, Brechin, Forfar, Arbroath and Barry (See Map F2.5.2.1.). In some parishes, therefore, the doctor/population ratio and hospital/bed population ration is quite low. Maps F.2.5.1.1. and F.2.5.1.2. show these ratios for all the parishes of Angus. The present distribution of facilities is, however, considered to be acceptable.

1.1. Development Problems

The present trend of centralising some medical facilities has resulted in the increased remoteness of large areas of the district to specialized medical facilities. This is again particularly evident in maps F.2.5.1.1. and F.2.5.1.2. where most of the Western and central parishes have scored low in their doctor and hospital-bed per population ratio.

In addition, the economic situation of Scotland as a whole has placed considerable limitations on the policies for improvement of the health services in Angus. New development will depend to a large extent on the redeployment of funds from other services. A third but not insignificant implication is the fact that the Scottish Health Service is one of the largest employers of female labour in Scotland. However, with the present pattern of employment tending towards industries, and especially service industries, competition in the female labour market has become extremely severe. The Health Services will therefore have to offer attractive remuneration for part-time work, in order to remain competitive.

1.2. Development Policies

Based on the national guidelines, the Tayside Regional Council has set out certain priorities in its development policies. Those are as follows:

- 1) The promotion of health care in the community through the progressive improvement of primary care services and community care services.
- 2) More positive development of health services for families in areas of multiple deprivation.
- 3) Continued improvements in hospital- and community health services for the elderly, the mentally ill and handicapped and the physically handicapped.
- 4) The encouragement of preventive measures and the development of a fully responsible attitude to health on the part of the individual and the community.

Provision of health centres is therefore of high priority in achieving the results aimed at by these policies. Already centres at Brechin, Friockheim, Kirriemuir and Carnoustie have been completed and in use. At present, a centre is being constructed at Ninewells and one is under consideration for Arbroath.

1.3.

Development Impediments

One major impediment is the vulnerability of the population growth rate figures which are often based on major assumptions. The population of Angus in particular has fluctuated over the period 1960 and 1978 and together with this is the fact that the change has been spread very unevenly among the parishes. Outmigration has contributed largely to this fluctuation. This has made planning somewhat more difficult.

Financial constraints will continue to plague the sector and therefore slow the pace of development. Also associated with this are the implications that major health service developments can have for other sectors such as transport and water services. This problem can be partly reduced by an increased co-ordination between the Health Service Sector and the other sectors concerned with the development of Social and Physical infrastructure.

Chapter 2.Towards Priority Areas

2.1.

Sectoral Methodological Approach

To determine the availability of health services in the Angus District, an inventory was made of the existing resources in terms of health facilities and manpower. Thus, data collection was focused on the spatial distribution of health infrastructure (hospitals, health centres and clinics) as well as of health manpower (doctors, nurses and dentists). Existing policies with regard to certain priorities in the provision of health services were likewise considered.

Two(2) indicators were established, namely, the doctor-population ratio and the bed-population ratio, in order to determine the adequacy/inadequacy of health services and facilities in the individual parishes and in the process, determine which parishes have some or less similar health service levels. Furthermore, to differentiate the parishes in terms of their functions, a distinction was made as to the type or nature of existing health services in an area for this contributed to the overall determination of an area's level of development. Thus the presence of a hospital in a certain area was assumed to indicate that it is performing a higher order function than the presence of a health centre or clinic.

The above variables will be elaborated further in the proceeding sections of this report.

2.2.

Contributing Variables to Homogeneity Analysis

For the homogeneity analyses, (two (2) variables were defined and calculated: (a) the doctor-population ratio and (b) the hospital-bed population ratio. However, since the presence of a hospital and doctor were limited to few specific locations, such was not enough to discriminate among the parishes if the ratios were to be calculated only for the areas where they are located. Thus, it became necessary to assume the catchment areas of doctors and hospitals, since their service extends over and beyond the parish boundary. An assumption was made then that people living in an area without any doctor or hospital tend to go for their needed health services to the nearest parish where such services are provided.

The parishes with the doctors and the hospital beds were made the reference points to estimate the distance of other parishes to the nearest doctor and hospital. A parish with the doctor and hospital including other parishes nearest to it were assumed to be the catchment area of such services.

Once this had been determined, the doctor-population ratio and the bed-population ratio was calculated by adding the population of the parishes within a certain catchment area and dividing this by the number of doctors or beds. However, since the people in the parish where the beds or the doctors actually are, have some chances of utilizing them than people in the other parishes, a tipping off factor according to distance was introduced.

To illustrate:

Parish	No. of doctors	Population
Barry	5	8282
Parishes nearest to it		
Monikie	-	854
Panbride	-	1707
	<hr/>	<hr/>
Total	5	10843

Population per doctor = 10843

$$\begin{array}{r} \text{(in Barry)} \quad \underline{5} \\ = 2169 \end{array}$$

The tipping off factor according to distance is as follows:

- 0 - 2 km - 1
- 3-5 km - 0.1
- 6-8 km - 0.2
- 9 km - 0.3

Monikie is approximately 8 km from Barry and Panbride only 1 km, population per doctor for these two parishes were:

$$\begin{aligned}\text{For Monikie} &= \frac{10843}{5} = 2169 \\ (2169) (0.2) &= 434 \\ 2169 + 434 &= 2603\end{aligned}$$

$$\begin{aligned}\text{For Panbride} &= \frac{10843}{5} = 2169 \\ (2169)(1) &= 2169\end{aligned}$$

The number of people per hospital bed and per doctor per parish were classified and given a score value, ranging from 1 to 5, such that the more people served by a hospital or a doctor, the lower a score it gets. The reasoning behind this, is that although health services have an indirect contribution to economic growth, its adequacy was assumed to have an effect on the productivity of the people.

In the individual scores of the parishes with regard to the two variables, refer to Appendix Table 2.2.1.

2.3. Contributing Variables to Hierarchization

Due to the absence of data at the village level, on the distribution of health infrastructure and manpower, variables on health contributed only to the hierarchization of urban centres.

A distinction was such as to the type of health services in the 6 major towns of Arbroath, Montrose, Forfar, Brechin, Carnoustie and Kirriemuir. Thus health infrastructure was further classified into hospitals, health centres and clinics, with the presence of a hospital getting more weight than the other ten. This weighting within function was also applied for health manpower with the presence of a doctor getting more weight than a nurse or a dentist.

Each parish was given a score value from 1 to 5 for the type of health facilities and manpower. The weighting scale within functions is as follows:

Health manpower:

Doctors - 3

Nurse - 1

Dentist - 1

5

Health Facilities;

Hospitals - 3

Health Centres

1

Clinics 1

5

See Appendix Table 2.3. for details.

2.4. Calculation of data, existing and non-existing

Data on the distribution of health facilities and manpower were available on the parish level. Existing policies were, however, given in broad terms and lacked the spatial dimension required. As such, specific locational priorities could not be determined. Threshold levels or scores for health services were likewise lacking and so comparison of existing health service levels as against certain established standards could not be done.

2.5. Data Analyses for Homogeneity and Hierarchization

2.5.1. Homogeneity Analysis (Refer to map 2.5.1.1.)

In terms of the doctor population ratio, the glens were divided into 2 distinctive homogenous zones. The parishes of Glenisla, Lintrathen, Cortachy and Clova composed that part of the glens which is hardly served by a doctor and Loch Lee, Lethnot - Navar and Edzell on the other extreme.

Such a difference could be explained by the presence of a doctor in Edzell with some other surrounding parishes as well.

Among the 6 major towns, only Montrose appeared to have a highly favourable doctor-population ratio. Other parishes contiguous to it made up another homogenous zone which was relatively well served by doctors. The situation in terms of the hospital-bed population ratio slightly differs. The western position of the glens likewise scored low with respect to the number of people per hospital bed. The parishes along the central and southeastern position of the district formed another homogeneous zone with some or less an average level of bed-population ratio.

2.5.2. Hierarchization of Urban Centres

The type of health facilities and manpower existing in the 6 major towns indicated that Arbroath, Montrose and Forfar had a relatively higher level of health services than Brechin, Carnoustie and Kirriemuir. Facilities in the latter were mostly health centres and although there were doctors, nurses and dentists practising in these areas, the number was smaller than in Arbroath, Forfar and Montrose.

Chapter 3 Sectoral Recommendations

To ensure the functioning of the indentified growth centres, certain inputs with regard to health services are needed.

The towns of Arbroath, Montrose and Forfar are already equipped with the necessary health facilities and manpower. Kirriemuir and Carnoustie have only health centres and would require as a minor urban centre a hospital and additional health manpower. But since an excess bed capacity already exists in the District as a whole, the establishment of a hospital for these areas should not be necessary. Further investigation should be devoted towards finding alternative uses for these excess capacities.

Among the priority areas for rural development only one (Kirkden) has a health centre. Establishment of rural health centres for each rural key centre is necessary if the facility requirement of such centres are taken into account. However, limited finances its possibility. As such, there should be further investigation on the most feasible and appropriate locations of health centres among the identified rural priority areas.

Appendix Table 2.3.1.

Scores per Parish on Health Variables (for Hierarchization)

Town	Type of health facilities			Total	Type of health manpower			Total
	Hospitals	Health centres	Clinics		Doctors	Nurses	Dentists	
Arbroath	3	-	1	4	3	1	1	5
Montrose	-	1	-	1	1.5	1	1	3.5
Forfar	3	-	1	4	3	1	1	5
Brechin	3	1	-	4	1.5	1	1	3
Carnoustie	3	-	1	4	2	1	1	4
Kirriemuir	-	1	-	1	1.5	1	1	3.5

Appendix Table 2.2.1. Score per Parish on Health Variables (for Homogeneity Analysis)

No.	Town	Population No.	Weighted doctor/pop.ration	Score	Weighted bed/pop.ratio	Score
21	Barry/Carnoustie	8282	1:2169	2	1:302	3
22	Monikie	854	1:2603	1	1:328	2
23	Panbride	1707	1:2169	2	1:302	3
24	Arbirlot	518	1:1821	3	1:277	4
25	Arbroath+Vigeans	24,752	1:1655	3	1:252	5
25	Carmyllie	439	1:1670	3	1:302	3
215	Kirkden	844	1:1392	4	1:302	3
216	Inverkeilor	707	1:1670	4	1:302	3
217	Lunan	264	1:1638	4	1:347	1
218	Kinnell	598	1:1392	5	1:302	3
325	Maryton	250	1:1512	4	1:318	2
326	Craig	1292	1:1512	4	1:318	2
327	-Dun	286	1:1368	5	1:318	2
328	Montrose	11213	1:1260	5	1:289	4
423	Farnell	302	1:1609	4	1:262 *	4
424	Brechin	7184	1:1463	4	1:238 *	5
429	Logiepert	556	1:1386	5	1:1318	2
430	Stracathro	744	1:1609	4	1:262 *	4
431	Edzell	812	1:1042	5	1:286 *	4
432	Careston	142	1:1756	3	1:262 *	4
440	Menmuir	404	1:1756	3	1:286 *	4
441	Lethnot+Navar	101	1:1355	5	1:309 *	3
442	Loch Lee	129	1:1355	5	1:333 *	2

57	Inverarity	500	1:2344	2	1:290	3
58	Glamis	658	1:2527	2	1:317	2
59	Newtyle	842	1:1302	5	1:370	1
510	Eassie/Nevay	334	1:1432	4	1:343	1
511	Kinnetles	202	1:2344	2	1:290	3
512	Airlie	475	1:2527	1	1:343	1
513	Kirriemuir	6116	1:2106	2	1:317	2
514	Forfar	13543	1:1953	3	1:264	4
519	Guthrie	196	1:1392	5	1:317	2
520	Rescobie	373	1:2148	2	1:290	3
521	Oathlaw	297	1:2148	2	1:290	3
522	Aberlemno	446	1:2344	2	1:290	3
533	Tannadice	596	1:2344	2	1:290	3
534	Cortachy/Clova	316	1:2738	1	1:370	1
535	Kingoldrum	211	1:2317	2	1:343	1
536	Lintrathen	316	1:2738	1	1:370	1
537	Glenisla	331	1:2738	1	1:370	1
538	Fern	470	1:2539	1	1:317	2
539	Ruthven	126	1:1562	3	1:370	1
543	Dunnichen	1132	1:2148	2	1:290	3

* Calculated using district population
Appendix Table 2.2.2.

Tip-off factor (According to distance)

In doctor-population ratio:

- 0 - 2 km = 1
- 3 - 5 km = 0.1
- 6 - 8 km = 0.2
- 9 km = 0.3

For bed-population ratio:

- 0 - 3 km = 1
- 4 - 7 km = 0.1
- 8 - 11 km = 0.2
- 12-15 km = 0.3
- 15 km = 0.4

Appendix Table 2.2.3.

<u>Scale</u>	<u>Score</u>
2800 - 2527	1
2526 - 2106	2
2105 - 1756	3
1755 - 1432	4
1431 - 1000	5
400 - 343	1
342 - 317	2
316 - 290	3
284 - 264	4
263 - 230	5

SECTORAL REPORT G

EDUCATION

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G. Education

Chapter G.1.

Present Situation

G.1.1.

Existing situation

Map G.1.1. shows the distribution of these schools in the area.

It can be seen from the diagram that most of the schools are located in the lowland areas.

At present there are altogether 472 teachers employed in the primary schools and approximately 485 in the secondary schools, including part-time teachers. (Table G.1.1.(a) and G 1.1.(b)).

Enrolment: The total enrolment as at 1980 was 9915 pupils in primary schools and 6975 pupils in secondary schools (See also Table G.1.1.(a) and G.1.1.(b). Most of the schools had more than 250 pupils. However, in the rural areas there are 20 schools, almost one third of the total, with under 50 pupils, including 13 with less than 20 pupils.

Spare capacity: All but two of the schools have some spare capacity.

Careston has no spare capacity and in Glamis the exceptional case of a parish school where the number of enrolment exceeds the design capacity of the school by a number of 16. The maximum spare capacity appeared in Tannadice parish with a figure 306. The rests are detailed also in Table G.1.1.(a) and G.1.1.(b).

G.1.2.

Development problems

The rural schools have had a fluctuating roll, due mostly to depopulation of farming areas, while the burgh rolls have been increasing steadily. The fluctuating problem in the individual rural school rolls is due mainly to three factors:

- a) the movement of people to and from an area
- b) the education authority's policy in which certain schools are closed, thus increasing the roll of nearby schools, and the conversion of some school buildings for other uses, for example nurseries.

c) in addition, constant changes in public transport services has also affected strongly the accessibility of certain rural schools.

Table G.1.1.(a) The main locations of primary schools in Angus District

Code number	Town	No. of schools	Design capacity	Involment	Spare	No. of teachers	Teacher/pupil ratio
201	Barry Carnoustie	3	1334	1090	244	45.4	1:24
202	Monikie	2	170	130	40	8.4	1:15
203	Panbride	1	75	54	21	3.2	1:17
204	Arbirlot	1	75	26	49	2.3	1:11
205	Arbroath St. Vigeans	9	3939	2938	1001	134.5	1:22
206	Carmyllie	1	175	74	101	4.4	1:17
215	Kirkden	1	231	155	76	6.8	1:23
216	Inverkeilor	1	175	114	61	5.2	1:22
327	Dun	1	48	19	29	2.2	1:9
328	Montrose	6	1934	1470	464	65.9	1:22
423	Farnell	1	73	29	44	2.1	1:44
424	Brechin	2	1018	796	222	34.6	1:23
429	Logiepert	2	86	36	50	2.2	1:16
430	Stracathro	1	50	15	35	1.1	1:14
431	Edzell	1	187	85	102	5.2	1:16
432	Careston	1	24	24	0	2.2	1:11
440	Menmuir	1	50	12	38	1	1:12
441	Lethnot Navar	1	20	11	9	1.1	1:10
442	Loch Lee	1	20	11	9	1	1:11

Table G.1.1. (b) The main locations of Secondary Schools in Angus District

Code number	Town	No. of school	Design capacity	Inrolment	Spare	No. of teacher	Teacher/pupil ratio
201	Barry Carnoustie Arbroath & St. Vigeans Montrose Brechtin Newtyle Kirriemuir Forfar	1	1370	977	393	68.4	1:14
205		2	2729	2145	584	146.7	1:15
328		1	1739	1077	662	73.7	1:15
424		1	1449	771	678	57.4	1:13
509		1	205	90	115	9	1:10
513		1	1046	671	375	47.6	1:14
514		1	1613	1244	369	82.1	1:15
	TOTAL	8	10151	6975	3176	484.9	1:14

* Data Source: School Census 1980. Tayside Regional Council Education Department

507	Inverarity	1	75	61	14	3.3	1:18
508	Glamis	1	50	66	-16	3.4	1:19
509	Newtyle	1	132	83	49	6.4	1:13
510	Eassie & Nevay	1	50	32	18	2.1	1:15
512	Airlie	1	75	25	50	2.2	1:11
513	Kirriemuir	3	1059	656	403	30.6	1:21
514	Forfar	6	1932	1474	458	65.6	1:22
522	Aberlemno	2	70	56	14	4.4	1:13
533	Tannadice	1	389	83	306	4.4	1:19
534	Cortachy & Clova	3	55	51	14	4.4	1:9
535	Kingoldrum	1	20	12	8	1	1:12
536	Linthrathen	2	50	41	9	4	1:10
537	Glenisla	1	50	20	30	2	1:10
539	Ruthven	1	20	12	8	1.0	1:12
543	Dumnichen	1	301	164	137	8.7	1:19
	TOTAL	64	14012	9915	4097	472.3	1:21

G.1.3.

Development policies

In recent years, Angus District Council has adopted certain development policies aimed at solving the problems of the educational sector.

As some parishes are experiencing a rapid fall in their primary school enrolment a policy decision has been made to close these when the number of pupils falls below 10. On the other hand, there is a policy to establish, as far as possible, schools with minimum enrolments of 100 pupils, at focal points in the rural settlement pattern.

Since the burgh schools are convenient to most parts of the county, there is a general aim to close the old junior secondary schools in the rural areas, and accomodate the pupils in large comprehensive schools in various burghs.

In any case, the catchment areas need to be frequently viewed on the basis of a maximum journey of 30 minutes walk between home and school.

For those areas where distances are excessive for walking to school and where no public transport is available, the education authority is obliged to provide free transport.

A change in educational policy for rural schools must always be considered in connection with transport facilities. On this basis some small schools will have to be maintained in the highland parts, and rural areas for as long as possible .

In the policies of the education department, the introduction of nursery classes in each burgh has been considered. Demand for places in these schools may grow - but the rate of increase in Angus is not clear.

As for future trends in special technical training and non-vocational, leisure-time education, it still remains uncertain beyond the next few years; there is at present no special policy dealing with this aspect.

G.1.4.

Development Impediments

The future development for educational facilities in Angus depends principally upon (a) the size and character of population and its geographical distribution, (b) existing provisions and their potential for improvement and adaption, and (c) future trends in educational preferences and requirements including government policies.

The fluctuation of enrolment due mainly to depopulation has been a predominant constraint in further development.

Although most of the schools may not, at present, feel the pressure of overcrowding, there is still a need for an increased capital allocation to modernize as well as to make necessary improvements to educational facilities. The main impediment with regard to capital expenditure on education is the level of resources which is likely to be available relative to the actual needs within the area.

Chapter G.2. Towards Priority Areas

G.2.1. Sectoral Methodological Approach

The methodological approach adopted by the educational sector during the survey process was, in principle the same with that described in the General Report.

G.2.2. Collection of data

Most of the data were collected from Tayside Regional Council. The latest data available are 1980's census data, but data from as far back as 1975 were also used. Necessary dialogues with the responsible persons were occasionally held to clarify points of uncertainty.

Data for homogeneity analysis were mostly available at parish level, so all the observations and calculations were done at parish level. Nine of the 42 parishes lacked adequate data. These parishes are Fern, Oathlaw, Rescobie, Guthrie, Kinnell, Lunan, Craig and Kinnetlles.

Since data which could theoretically be used as indicators in homogeneity analysis were practically not existant, or, where existant, available only at a higher level than required, it was decided that attention would be concentrated on the collection of data with respect to the aspects of the number of schools, design capacity; actual enrolments of, and number of teachers in each school. Analysis and calculation lead to two variables contributing to homogeneity study, and these are discussed in the following sections.

G.2.3. Contributing Variables to Homogeneity

Homogeneity analysis was performed at parish level. Two variables were thought to be most appropriate in the homogeneity analysis. These were spare capacity of a school and teacher versus pupil ratio in the school.

Spare capacity is defined as the difference between design capacity and actual enrolment of a school, i.e.

spare capacity = - number of pupils designed for enrolment

Since there are not as many secondary schools as primary schools at parish level, it was decided to take only the spare capacity of primary schools into consideration for homogeneity analysis. The data are based on the year 1980.

Teacher/pupil ratio is defined as the number of pupils per teacher in a school, i.e.

$$\text{teacher/pupil ratio} = \frac{\text{number of teacher}}{\text{number of pupils}}$$

Again these are only taken from primary school at parish level and for the year 1980.

G.2.4. Contributing variables to hierarchization

In the rural centre hierarchization process, the education sector contributed two variables to the analysis, namely, type of school and number of schools at village (settlement) level.

The type of school differentiates between primary school and secondary school in a village and gives an indication of size, character and level of the village.

The number of schools in a village also gives an indication of size, character and level of the village in question.

These two variables, integrated with other variables in social aspect (see General Report) are brought together to form contributing variables in rural centre hierarchization.

G.2.5.

Data analysis for homogeneity and hierarchization

During the data analysis, simple calculations were executed to find out spare capacity and teacher/pupil ratio according to the definition mentioned in G.2.2. Calculation was done, using the average values as representative values of the spare capacity and teacher/pupil ratio for a parish if more than one school appeared in the parish. The result is given in columns II, IV in Table G.2.5.(a).

It can be seen from the table that the average spare capacity and average teacher/pupil ratio for each village varies widely from - 16 to 306, and 1:9 to 1:24 respectively.

Table D.2.5(c) Contributing Variables to Homogeneity

Variables Parish	I Average spare capacity in primary school	II Score	III Average teacher/pupil ratio	IV Score
Barry Carnoustie	79	3	1:24	5
Monikie	120	4	1:15	3
Panbride	21	2	1:17	4
Arbirlot	49	3	1:11	2
Arbroath	109	4	1:22	5
Carmyllie	101	4	1:17	4
Kirkden	76	3	1:23	5
Inverkeilor	61	3	1:22	5
Dun	29	2	1:9	1
Montrose	77	3	1:22	5
Farnell	44	2	1:14	3
Brechin	111	4	1:23	5
Logiepert	25	2	1:16	3
Stracathro	35	2	1:14	3
Edzell	102	4	1:16	3
Careston	0	1	1:11	2
Menmuir	38	2	1:12	2
Lethnot	1	1	1:10	1
Loch Lee	9	1	1:11	2
Inverarity	14	2	1:18	4
Glamis	- 16	1	1:19	4
Newtyle	49	3	1:13	2
Eassie & Nevay	18	2	1:15	3
Airlie	50	3	1:11	2
Kirriemuir	134	4	1:21	5
Forfar	76	3	1:22	5
Aberlemno	7	1	1:13	2
Tannadice	306	5	1:19	4
Cortachy & Clova	5	1	1:9	1
Kingoldrum	8	1	1:12	2

Contd Table G 2.5. (c)

Variables Parish	I Spare capacity in primary school	II Score	III Teacher/pupil ratio	IV Score
Lintrathen	5	1	1:10	1
Glenisla	30	2	1:10	1
Ruthven	8	1	1:12	2
Dunnichen	69	3	1:19	4

A scoring technique was then used in ranking the data for homogeneity analysis.

The scoring was carried out on the base of the assumptions that:

- (1) The greater the spare capacity, the greater the potentiality in terms of economic growth,
- (2) The larger the teacher/pupil ratio, the greater efficiency of resources incurred as compared to the standard teacher/pupil ratio of 1:32, which is recommended in Guidelines for Rural Centre Planning.

The scoring ranges for the homogeneity analysis is to be found in table G.2.5.(b).

Table G.2.5.(b) The Scoring Ranges for Homogeneity Analysis

The range of spare capacity	Score	The range of teacher/pupil ratio	Score
-16 - 9	1	1:9 - 1:10	1
10 - 44	2	1:11 - 1:13	2
45 - 79	3	1:14 - 1:16	3
80 - 134	4	1:17 - 1:19	4
135 - 306	5	1:20 - 1:24	5

According to Table G.2.5. (b) all variables in columns I, III of table G.2.5.(a) are given the scores, the results are arranged in the same table in columns II and IV.

For visual comparison in homogeneity, two maps are prepared (see G.2.5.(a) to show respectively the spare capacity of school and teacher/pupil ratio for the 34 parishes, using the same scoring system established in Table G.2.5.(b).

Note that 9 parishes where data were non-existent are left blank.

Visual comparison between the two maps shows that a zone in the highland area, which approximately covers $\frac{2}{5}$ of the whole district, presents an unfavourable situation with regard to economic growth.

For the low land area, teachers (human resources) are more efficiently distributed as compared with the highland area. However, there remain some potential facilities to be developed.

Chapter G.3. Sectoral Recommendations

Depopulation seems to be the main reason for the fall in school enrolment, resulting in the closure of some schools by local government. This action increases the pressure of unemployment due to the fact that some teachers have to leave their places after closures. On the other hand, it creates more idle school facilities.

Some pre-feasibility study should be carried out, especially in these highland areas such as Loch Lee, Lethnot and Navar, Cortachy and Clova, Lintrathen in order to formulate better policies for the maintenance of the existing schools and to reduce the long travel distance to school in these areas.

For those places such as Tannadice, Kirriemuir, Edzell, Brechin, Carmyllie and Monikie etc., a study could be launched aimed at transforming these idle school facilities into other usages, for instance nursery schools, public libraries or public clubs.

For the only overcrowded school - Glamis (with an overcrowded number of 16), an investigation could be carried out to determine the necessity of increasing the school facilities from a long term point of view.

Finally, a study should be undertaken to lay the basis for a better financial allocation in the educational sector.

References

- (1) Guidelines for Rural Centre Planning United Nations 1979.
- (2) Interim Education Report
Angus County Council, May 1975.
- (3) School Census 1980
Tayside Regional Council Education Department
- (4) Inner City Local Plan
City of Dundee District Council November 1979.
- (5) Tayside Potential for Development.

SECTORAL REPORT H

WATER SERVICES

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SECTORAL REPORT H. - Water ServicesChapter 1. Present SituationH.1.1. Water Supply and Consumption

The entire Angus District draws its water supply from eight (8) different sources, as indicated in table H.1.1.1. Although the total capacity to overflow and the estimated safe yield as indicated in the said table are 8,234,020,000 and 31,141,000 gallons per day respectively, the quantity of water allotted and/or available wholly for Angus District could not be ascertained because three (3) of these sources which are Lintrathen, Backwater and Loch Lee are also supplying the other districts of the Tayside Region and their respective water allotment and/or consumption are partly known.

The only available data on the average daily consumption as furnished by the Water Services Council at Montrose are tabulated in Tables 1.1.2. and 1.1.3. These were derived by actual measurements using computers which has been started in 1978.

Table 1.1.2.

Reservoir	Average Daily Consumption (g)		
	1978	1979	1980
Crombie	66,000	60,000	47,080
Balmossie	159,000	160,000	167,200
Clash	232,000	249,000	239,140
Den of Ogil	902,000	896,000	887,040
Glen Ogil	1,672,000	2,232,000	2,104,300
Monikie	93,000	103,000	86,680
Lintrathen (Cairhall)	216,000	464,000	454,080
Loch Lee	2,857,000	3,050,000	3,161,400

The average daily consumptions of the reservoirs Mooran Burn and North Esk (Kinnaber) are not available.

For the main towns of the Angus District, the average daily consumption is indicated in the following table.

Table 1.1.3.

Town	Average Daily Consumption (g)		
	1978	1979	1980
Arbroath	1,882,000	1,973,000	2,012,120
Brechin	531,000	563,000	625,020
Carnoustie	540,000	578,000	612,700
Forfar	1,223,000	1,137,000	1,181,400
Kirriemuir	304,000	314,000	287,100
Montrose	1,750,000	1,801,000	1,665,400

As per information from the water services council of Montrose, the normal average per capita water consumption in the area is 40 g for domestic use. The domestic water consumption in the area is paid by a fixed rate.

1.2. Development Problems

The major difficulty affecting the resolution of the development problems of the Angus District as far as water services is concerned, is the inadequacy of water supply which is caused by either of the following:

- the existing sources of supply or abstraction rate are no longer adequate to meet the present demand, or
- the distribution system (pipes) are either too small or too old. A number of the distribution systems in fact was laid as early as in the 1930's.

Table H.1.1.1.

Name of Source	Description	Capacity to overflow (mgd)	Estimated safe yield (mgd)	Average Consumption (mgd)	Areas Served	Scope for development	Remarks
1. North Esk (Kinnaber)	River Intake	-	2.1. Autho- rized ab- straction 7.5mg in 5 days M-P	1.552	Montrose Burgh	yes *	Could be developed with provision of entirely new plant
2. Mooron Burn	Stream Intake	-	0.4	0.385 (estimate)	Breechin Burgh (Part)	no	Deficit made up w/loch lee water supply to be abandoned
3. Clash	Impounding reservoir	5.02	0.5	0.273	Kirrimuir Burgh and surrounding area	no	To be augmented by Lintrathen east trunk main
4. Lintrathen	"	2.141	13.0	15.791	Carnoustie (Part)		Supplied to Dundee Angus, Perth divisions. Bulk supply to five regions
				0.202	Lintrathen, Kilry, Ruthven, Airlie, Fessie Glamis, Rescobie, Newtyle, Kettinds, Craichie, Charleston, Kingsmuir, Part Forfar		
				0.273			
				0.090	Rural area surrounding Monkie and Newbiggin		supplied to Perth Division

				0.420	Carnoustie(Part), Barry and Panbride,Arbirlot and parts of Carmyllie and Easthaven	Yes	Further development from rivers New-ton,Muckle and Isla,with possible extension to river Shee and Ardie
5. Backwater	Impounding reservoir	5.400	9.0				
6. Loch Lee	"	495	3.4	1.58	Aberlennock(part),Carmyllie(part),Bankhead, Dun,Dunnichen,Farnell, Friockheim,Hill Side, Lethan,Logie Pert, Lunan Bay,Meikle, Kermy,Redford,Guthrie (part),Rescobe(part), Inverkeilor,Arbroath (part),St.Vigeans, Menmuir,Brechin parish, Kinnell,Lunan,Craig, Maryton,Stracathro area Edzell,Montrose parish, Brechin(part),Tarfside, Careston,Bridgend,Glen Lethnot,Kingoldrum, Lunanhead,Dikehead, Northmuir,Kirriemuir (part)		
				1.313	Bulk supply to Grampian region	Yes	Catchment capable of sustaining additional impounding reservoir storage.New works are however very expensive.
7. Den of Ogil	Impounding reservoir	133	0.991	0.987 (Forfar)	Forfar and District	No	White Burn Intake. Minimum flow 3 cusecs below which water cannot be abstracted.
8. Glen Ogil	"	60	1.75	1.883 (Arbroath)	Arbroath Burgh,Guthrie, Tannadice, Collieston	Yes	Catchment capable of sustaining additional impounding reservoir

The situation is further aggravated by the government's restraint on public expenditures. Another pressing problem also is the fact that, since some of the impounding reservoirs are supplying more than one district, any development or augmentation on either of the district would surely affect the supply to the other. This is also true of the service reservoirs within the Angus District wherein some are supplying more than one parish or village.

1.3. Development objectives and policies

First and foremost, it is emphasized that the provision of water services, as far as the laying of the trunk mains and main pipes is concerned, is the responsibility of the Regional authority. The laying of distribution pipes is anybody's business. Hence all the objectives and policies treated here are regional in scope.

In the preparation of a Regional Settlement Policy, it is the intention of the Water Services Department to ensure that, as far as possible, development is carried out in situations where services are readily available and can be provided at a reasonable cost. In other words, the best economic use is to be made of existing resources. In this regard, the water services Department has come up with objectives and policies which are listed below with their corresponding policies.

1.3.1. Objective - To provide and maintain a wholesome supply of water to all residential development, as well as industrial and commercial development.

Policies - The Regional Council will:

- 1.3.1.a. - Provide and maintain facilities for the storage, purification, treatment and distribution of the public water supply;
- 1.3.1.b. - Attempt to maximize the use of spare capacity in existing services;
- 1.3.1.c. - Attach a high priority to the maintenance of existing systems;

- 1.3.1.d. - Provide for new development only where these can be supplied at reasonable cost to the regional council; and
- 1.3.1.e. - Normally requests refusal of planning applications where services cannot be provided within a period of four (+) years.

1.4. Programmes and Budgets

The regional reports have clearly spelled out that the provision of adequate water infrastructures to relieve constraints upon development is the first priority. However, in the preparation of the capital works programme for water services, the greatest difficulty has been experienced in determining which of the necessary schemes should be nominated as of the highest priority to keep the total expenditure within the limits imposed by the Government in any particular year. In this regard, the Government has devised guidelines which are to be taken into account in the preparation of the programme. These guidelines are listed below in order of priority.

- 1.4.1. The improvement of existing water supply services to ensure compliance with statutory obligations by eliminating, inter alia, restrictions in water supplies due to an overdrawn source, or intermittent water supplies due to inadequacies in the distribution system. Schemes carried out under this heading would usually allow for reasonable future development.
- 1.4.2. The provision of water supply for new housing and industrial development where this can be done at a reasonable cost;
- 1.4.3. The replacement or complete renewal of existing water mains where existing services are severely affected or there is likely to be danger to life or limb;
- 1.4.4. The improvement of the quality of existing water supplies (all existing supplies are wholesome within the meaning of the legislation but can nevertheless cause complaints of taste, discolouration etc.);

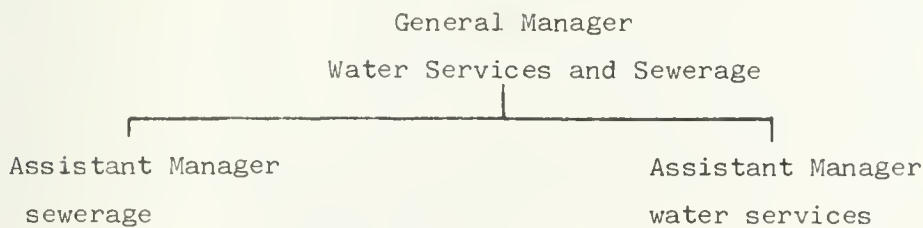
1.4.5. The provision of public water supplies for the first time to existing properties where this can be done at reasonable cost; and

1.4.6. The development of existing or new sources of water supply to meet increasing demand and to replace existing small sources which are for one reason or another unsatisfactory (this item is not necessarily of the lowest priority but would appear from time to time in the programme as and when the situation demands).

Any water services programme proposed by the district and/or local authorities must have the planning consent of the Regional Council. Any deficiency in the expenditures allotted by the government in carrying out the said proposal is already the responsibility of the local authority concerned. Table 1.4.1. shows the water services programme for the Angus District with corresponding legally, and not yet legally committed capital expenditure for the years 1980 - 1986 extracted from the Tayside Regional Council Financial Plan of 1980. The standard charges for communication pipes are shown in Appendix 1.4.1.

1.5. Administrative Organization

The Angus District has actually one organizational set-up for both water supply and sewerage as shown below:



The water services office is situated at Montrose while the sewerage office is at Forfar. The general manager maintains his office in both Montrose and Forfar and divides his time between the two (2) offices spending three (3) days in one and two (2) days for the other or vice-versa for the entire working days of the week.

Financial Plan 1980

TAVSIDE REGIONAL COUNCIL
Not yet legally committed capital expenditure
Programme - WATER SERVICES - WATER SUPPLY

£1000

Project Nature of expenditure (insert start date where appropriate)	Project Appraisal I or II	Policy Priority	Estimated Total Cost	Prior to	PHASING OF EXPENDITURE										Estimated additional Full year Running costs
					1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	later years	excluding loan charges	loan charges		
1	2	3	4	5	6	7	8	9	10	11	12	13	14		
Muirheads Reservoir	-	-	630	-	-	-	-	-	-	-	630	-	-		
Brechin-Trinity Reservoir	-	-	400	-	-	-	-	-	-	-	400	-	-		
Framedrum Reservoir	-	-	50	-	-	-	-	-	-	-	50	-	-		

Project Nature of expenditure (insert start date where appropriate)	Project appraisal I or II	Policy priority	Estimated total cost	Prior to 31.3.80	Phasing of expenditure							later years	Estimated additional full year running costs	
					1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	12		13	14
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Montrose Augmentation-jink from Borcholjes to Kinnaber	-	-	132	-	-	132	-	-	-	-	-	1.3	18	
Cjatto washwater-recovery	-	-	36	-	-	36	-	-	-	-	-	-	5	
Rossie water tower	-	-	44	-	2	42	-	-	-	-	-	-	6	
Forfar-jink main from ETM to Balmashanner	-	-	274	-	70	119	72	14	-	-	-	-	39	
Montrose Augmentation Lintrathen - Loch Lee	-	-	2500	-	-	-	-	100	1300	1,100	-	-	357	
Forfar - Balmashanner Reservoir	-	-	440	-	-	-	-	330	100	10	-	4.4	62	
Loch Lee Access Road	-	-	190	-	-	-	-	185	5	-	-	0.4	27	
Lintrathen treatment works	-	-	3300	-	-	-	-	-	-	1300	2000	-	471	
Baggerton Reservoir	-	-	440	-	-	-	-	-	-	-	440	-	-	
Monikie/New Landhead Augmentation	-	-	250	-	-	-	-	-	-	-	250	-	-	

Chapter 2

Towards Priority Areas

2.1.

Sectoral Methodological Approach

In determining the information requirements to be collected during the fieldwork, a careful analysis of the development goals, objectives and problems and survey objectives, as identified by the entire group from the available data furnished before the fieldwork, was made in order to ascertain what part of the water services system of the Angus District poses a hindrance to its development. As a result, the water services group identified the storage and distribution as the major problems of the Angus District. Out of these problems, the specific information requirements were derived with the ultimate intention of identifying the relevant indicators required for the formulation of variables that could be used for the delineation of homogeneous areas and hierarchization of centers.

The variables thought of at first to be contributory to both the hierarchization of centers and delineation of homogenous areas (both using index numbers and factor analysis) were the following:

1. Per capita water consumption per parish;
2. Per capita water potential availability per parish;
3. Maintenance and operating expenses (MOE) per capita per parish; and
4. Per capita investment cost per parish

The underlying hypothesis in the formulation of the above-listed variables was based on the presumption that all of these are indicators of the development status of the parishes - meaning that the greater the respective values of these variables on a certain parish, the more developed that particular parish is.

As far as factor analysis is concerned, it was expected that the actual values of these variables are correlated with the values of certain variables of the social and industry sectors. This means that, for example, the values of these variables are directly proportional to the values of the variable on population density in the case of housing and demography or the values of the variable on the number of inhabitants employed in commerce and industry sector.

It was, however, expected that the variables of water services were not correlated with the variables of the Agricultural sector because the agriculture in the area depends only on the rainfall and not on irrigation.

The potential water availability per capita, aside from its contribution to the hierarchy of centers and delineation of homogenous areas, could give an indication as to how far a certain parish could still absorb further development.

2.2. Data Collection

All the data relative to the information requirements mentioned in sec. 2.1. were gathered from the Regional Council's Planning and Water Services Departments at Dundee and the Angus District Water Council at Montrose. In addition, interviews were also conducted to support the data gathered. Unfortunately, of the information requirements listed in Table 2.1., only the following were available:

- a. Location, elevation and capacity of impounding reservoirs/service reservoirs;
- b. Diameter and length of pipes;
- c. Areas/parishes being serviced: and their elevations;
- d. Programmes and budgets;
- e. Policy, objectives and administration;
- f. Consumption of selected reservoirs; and
- g. Consumption of the main towns.

The data on the location, elevation and capacity of the storage reservoirs, length and diameter of pipes as well as the parishes being served, were all taken from the maps (Map 2.2.1. and 2.2.2.) furnished by the water services council at Montrose. The elevations of the different parishes centers were obtained from the topographic map of the district. These data were then incorporated together in table 2.2.1.

A careful scrutiny of the resulting tabulated data revealed that the only variable that could be derived and could be used in the homogeneity analysis is the potential water availability per capita per parish. This could be derived from the combined data on the diameters and lengths of the pipes, and the elevations of the storage reservoirs and the parish centers, using

Table 2.2.1.

Parish	Centre	Storage Reservoir	Capacity (000 gal)	Pipe diameter (inch)	Pipe Length (feet)	Difference in elevation (head-feet)	Potential quantity of water (000 9 pd)	Population	Per capita water potential
1. Brechin	Brechin	Trinity	2090	8" 12"	-	-	2090	7193	121
2. Careston	Mills of Careston	Meikle Tullo	3000	2	2100	590 (500)	118	140	351
3. Dun	Bridge of Dun	Lundie	150	2	1600	540(500)	134.70	270	208
4. Edzell	Edzell	Gannochy	48	6	6600	140	552.90	803	287
5. Lethnot Navar	Brigend of Lethnot	Meikle Tullo	1000	4	14500	245	191.80	100	800
6. Loch Lee	Tarfside	White Hillocks	1000	3	4000	85	95.76	128	312
7. Logie Pert	Craig	West Balloch	100	4	8000	225	228.12	550	173
8. Monmuir	Ballhall Crescent	Meikle Tullo	3000	2	2100	640(500)	117.62	400	122
9. Stracathro	Inchbarr	Lundie	150	2	1320	420	134.57	736	76
10. Arbrinot	Arbrinot	Crombie	48	4	8300	430	238.7	588	170
11. Arbroath	Arbroath	Framedrum Muirtena	3300	15 12	-	-	3300	24,373	56
12. Barry	Carnoustie	Pannure	1118	6	4,200	230	878.2	8299	44
13. Carmyllie	Redford	Westhills	5	3	8300	155	90.9	446	85
14. Monikie	Newbigging	Newbigging	10	4	6000	210	257.07	868	123
15. Panbride	Muirdrum	Crombie	48	3	6600	350	152.25	1736	37
16. Aberlemno	Aberlemno	Aberlemno	40	6	7280	50	311.96	467	278
17. Dunnichen	Letham	Dunnichen	150	6	9359	200	551.2	1135	202
18. Eassie Nevay	Eassie Mill	Airlie Dunnichen plus	50 150	3 6	2900 2460	195 300	173.6 1300	336 134-35	215 87
19. Forfar	Forfar	Baggerton	1500	-	-	-	1500		
20. Glamis	Glamis	Charleston	200	6	1600	250	1487	660	940
21. Guthrie	Guthrie	Framedrum	3,300	-	-	-	3200	196	56
22. Inverarity	Inverarity	Dunbarrow	50	3	4410	75	86.1	501	72
23. Kinnettles	Douglas Town	Kinnettles	50	3	10500	295	111.7	203	230
24. Kirkdon	Frickheim	Wuddylaw	150	6	10500	275	610.15	858	296
25. Oathlaw	Bogindollo	Meikle Tullo	3000	3	900	490	462.53	298	647
26. Rescobie	Burnside	Burnside	50	3	5280	65	73.0	374	81
27. Airlie	Airlie	Airlie	50	2	2100	75	45.5	476	40
28. Cortachy Clova	Dykehead	Dykehead	5	3	3245	145	140.4	317	185
29. Fern	Fern	Meikle Tullo	3000	2	660	280	157.8	471	140
30. Glenisla	Kirkton of Glenisla	Private (stream)	-	-	-	-	-	332	40
31. Kingoldrum	Kingoldrum	Kingoldrum	50	4	2640	10	83.56	212	164
32. Kirriemuir	Kirriemuir	Kirriemuir Hill	587	4	-	-	-	6082	40
33. Lintrathen	Bridgend of Lintrathen	Cathehill	25	4	2300	120	320.68	317	422
34. Ruthven	Ruthven	Airlie	50	3	6300	230	128.1	126	424
35. Tannadice	Tannadice	Meikle Tullo	3000	3	9500	490	150.7	598	105
36. Craige	Ferryden	Bal Kieffe	1200	4	1320	140	443	1245	148
37. Farnell	Farnell	Lundie	150	3	2300	470	309.2	302	427
38. Inverkeilor	Inverkeilor	Lundie	150	3	400	470	713.5	719	413
39. Kinneil	Kinneil	Wuddylaw	150	6	6600	300	801.26	608	550
40. Lunan	Lunan	Balkielle	1200	3	5280	185	124.14	268	193
41. Maryton	Maryton	Balkielle Balkielle plus	1200 1200	3 6	7260 7600	140 185	92.03 583.42	135 11166	284 100
42. Montrose	Montrose	Kinnaber	2,100				2100		
43. Newtyle	Newtyle	Newtyle	100	4	660	250	846.17	844	418

a conversion table. The process, although it has a certain limitation due to the fact that the conversion table is applicable only for pipes with diameter ranges up to 6 inches, is the only process available that could be used in determining the potential water availability given the data at hand.

The capacities of the main reservoirs (Loch Lee, Lintrathen and Backwater) were not taken into consideration because these are also serving other parts of the region and the quantity of water allotted to the different districts were not available or not known.

The capacities of the service reservoirs were not also taken into consideration except in few cases wherein the diameters of the pipes are more than 6", because most of them are serving more than one (1) parish and the consumption per parish was not available. Besides, the rate at which they are being filled up or drained are not known.

In computing for the potential water availability per parish, it was presumed that the size of the main pipe serving the center of a parish gives an indication on the total quantity of water being delivered to the entire area under the jurisdiction of that particular parish. In this regard, the lengths and diameters of the pipes that extend from the centers of the parishes to the main pipes from the service reservoir and the differences in elevations between the parish centers and the service reservoir/(head) were obtained and referred to the conversion table (Table 2.2.2.) to arrive at the potential water availability for each parish expressed in gallons per minute which were then eventually converted into gallons per day. These were then divided by the respective population to arrive at the potential water availability per capita per parish. Finally, a factor of 10/24 was multiplied to each of the values to account for the fact that the peak usage for water in the district averages 10 hours per day. All these data are incorporated in table 2.2.1.

Table 2.2.1.

Approximate discharge in gallons per minute for lines of piping under various water heads

Allowing for average number of bends and fittings

(a) For a Pipe Line 1000 Ft. in Length

Head or Bath	Discharge in gallons per minute											
	½ In. bore	¾ In. bore	1 In. bore	1 ¼ In. bore	1½ In. bore	2 In. bore	2½ In. bore	3 In. bore	3½ In. bore	4 In. bore	5 In. bore	6 In. bore
11												
1	16	45	93	1.63	2.57	5.28	9.22	14.5	21.3	29.8	52.1	82.2
2	23	64	1.32	2.30	3.63	7.46	13.0	20.5	30.1	42.1	73.6	116.0
4	33	91	1.87	3.26	5.14	10.6	18.4	29.4	42.7	59.6	104.0	164.0
6	40	1.11	2.29	3.98	6.29	12.9	22.5	35.5	52.2	73.6	127.0	204.0
9	49	1.36	2.80	4.88	7.71	15.9	27.7	43.6	64.1	89.5	156.0	246.0
12	57	1.57	3.25	5.64	8.90	18.3	32.0	50.4	74.0	103.0	180.0	285.0
16	66	1.81	3.73	6.51	10.3	21.4	36.9	58.1	85.4	119.0	208.0	629.0
20	74	2.03	4.18	7.28	11.5	23.6	41.2	64.9	95.4	133.0	233.0	367.0
25	82	2.27	4.67	8.14	12.9	26.4	46.1	72.6	106.0	149.0	260.0	411.0
30	90	2.48	5.11	8.92	14.1	28.8	50.5	79.5	146.0	163.0	285.0	450.0
40	1.04	2.88	5.91	10.3	16.3	33.5	58.3	92.0	135.0	188.0	329.0	529.0
50	1.16	3.21	6.61	11.5	18.2	37.4	65.2	102.0	150.0	210.0	368.0	581.0
75	1.42	3.93	8.10	14.1	22.3	45.7	79.9	125.0	184.0	258.0	451.0	712.0
100	1.65	4.55	9.35	16.3	25.7	52.8	92.2	145.0	213.0	298.0	524.0	822.0
150	2.03	5.59	11.5	19.9	31.5	64.9	143.0	178.0	262.0	366.0	637.0	1044.0
200	2.33	6.42	13.2	23.0	36.3	74.6	130.0	205.0	301.0	421.0	736.0	1461.0
250	2.61	7.20	14.8	25.7	40.7	83.7	146.0	230.0	337.0	471.0	824.0	1303.0
500	3.69	10.20	20.9	36.4	57.5	118.0	206.9	325.0	476.0	667.0	1164.0	1840.0

(b) For a Pipe Line More, or Less, than 1000 Ft. in Length

When a pipe line is more, or less, than 1000 ft. in length, the figure taken from the above table must be multiplied by the corresponding factor given in the following table.

Length	Factor	Length	Factor	Length	Factor	Length	Factor
Ft.		Ft.		Ft		Ft.	
50	4.47	500	1.414	2000	707	10.000	316
100	3.16	750	1.154	2500	633	5 miles	195
150	2.58	1000	1.0	3000	577	10 miles	138
200	2.237	1250	895	4000	500	50 miles	0616
300	1.827	1500	817	5000	447		
400	1.580	1750	756	7500	365		

Example:

To ascertain approximate discharge of a line of piping of 4 in. bore 5000 ft length and under 30 ft. head.

Approximate discharge for a 1000 ft. line as shown by table (a) is 163 gallons per minute.

The appropriate factor given by table (b) is .447.

Approximate discharge 163 .447
72.9 gallons per minute

2.3. Data Synthesis

In classifying homogenous areas by the use of index number, the values of the potential water availability per capita per parish were ranked and scored subjectively, because these values do not reflect the actual quantity of water being delivered. It only represents the potential capacity of the distribution system in an area - meaning the potential quantity of water that a particular size of pipe with a given length and head can actually deliver to a certain area. The classification with their corresponding rank and score are shown below.

Eventually, a colour code was applied to the abovementioned classification to produce a map (map 2.3.1.) entitled homogeneity analysis map based on the potential water availability.

Classification (9 pd)	Rank	Score
< 80	very bad	1
80 - 160	bad	2
160 - 240	marginal	3
240 - 400	good	4
> 400	very good	5

As could be noted in the above classification, the potential water availability per capita with values under 160 gpd considered in bad condition. This is arbitrary in the sense that these values do not entirely reflect the situation in an area because a 100 gpd per capita potential water availability, for example, may be ample in an area which has a predominantly domestic use whereas it may be a bad situation in an area with industries in it.

2.4. Conclusions and Recommendations

The results of the potential water availability per capita per parish coupled with the data in table 1.1 clearly illustrate that the problems of water supply in the Angus District are brought about by the abstraction rate or

the inadequate capacity of the reservoir and the piping system. This is aggravated by the restraint in government expenditures. In fact, the resolution of these problems will need a considerable time if the present restraint on government expenditures continues.

Based on the observed standard for the domestic average daily consumption per capita of 40 g as established by the water services council, at Montrose, the values of the potential water availability per capita revealed that of the 43 parishes, 2 have problems of water supply, one being due to inadequacy of the service reservoir and one is not supplied at all. Another 3 parishes are almost at the verge of their capacity limits.

The homogeneity analysis which was mainly based on the potential water availability per capita per parish shows that of the 43 parishes, 15 are still suitable for further industrial development. This conclusion was arrived at after applying an aggregate of 50% as provision for losses due to pipe incrustations, to leakage and peak demands, and based on the assumption that the daily average water consumption for the combined domestic and industrial use is 100 g

All of the six (6) priority towns are found not suitable for further industrial development. On the other hand, all of the eight (8) first priority areas for rural development are suitable for further development except for one which could only accomodate further domestic use. Of the second size(6) priority areas for rural development, only two (2) can accomodate further industrial development, three (3) can accomodate any development at all. All of these are classified and incorporated in table 2.4.1. in order of their suitability for development.

Table 2.4.1. Priority Areas for Development

<u>Town</u>	<u>Classification</u>
1. Arbroath	not suitable
2. Montrose	"
3. Forfar	"

Second priority

<u>Town</u>	<u>Classification</u>
1. Brechin	not suitable
2. Carnoustie	"
3. Kirriemuir	"

II. Rural Development - First Priority

<u>Parish</u>	<u>Classification</u>
1. Glamis	suitable
2. Newtyle	"
3. Inverkeilor	"
4. Kirkden	"
5. Edzell	"
6. Dunnichen	moderately suitable
7. Logie Pert	" "
8. Craige	not suitable

Second priority

1. Aberlemno	suitable
2. Arbirlot	moderately suitable
3. Monikie	not suitable
4. Carmyllie	" "
5. Inverarity	" "
4. Panbride	" "

The above-mentioned findings, although they depict to a certain degree the situation in the area, may not be really conclusive because they were based on a rough estimate given the data at hand and the time constraints. Thus based on this premise, in order to have a more realistic delineation of homogenous areas, at least two (2) of the originally formulated variables must be taken into account. Although accurate data on the daily per capita consumption could not be obtained readily, unless the metered system instead of the flat rate system will be employed in the area, it could be derived if the water services council at Montrose will

continue its recent extraordinary undertaking of measuring by computers the water consumption from the impounding reservoirs and the main from the main towns down to the parish level.

In the computation of the potential water availability per capita, losses, due to incrustations and leakage should be applied. In addition, more accurate data on the length of the pipes between the reservoirs and the area served as well as the difference in their elevations (head) should be obtained. The spare capacities of the impounding reservoirs should also be used. This could be obtained if the water allotment to the other districts will be made available. Finally, more time should be allotted for the actual fieldwork since it is believed that more relevant data were still available that could have been collected if given the opportunity. This was confirmed by the personnel of the water services council at Montrose.

Only when all the afore-mentioned recommendations are taken into account, a more accurate and realistic homogeneity analysis can be undertaken.

SECTORAL REPORT I

SANITATION

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I. SANITATION - SEWERAGE AND SEWAGE DISPOSAL

Chapter 1

Present Situation

1.1.1. Development Problems

The present situation of sewerage and sewage disposal in the Angus District is far from being satisfactory. Development opportunities in the District are limited because of the lack of available drainage.

Due to the continuing National Government restrictions on annual capital expenditure by the Regional Council as sewage authorities, the provision, improvement and maintenance of the sewerage systems and sewage treatment works have been limited. Unless adequate finance is available for the provision, improvement and operation of sewers and sewerage treatment works, the satisfactory condition of the rivers and streams cannot be achieved, even if the discharges from Industrial and agricultural premises and private sewage treatment plants are satisfactory.

The Tay River Purification Board have continued to express strong concern at the delay in the implementation of the programmes proposed by the Regional Councils for improving sewerage and sewage treatment works, eliminating existing polluting discharges to water courses and providing adequate capacity for housing and industrial development.

1.1.2. Development Policies

The Regional Council will provide, where appropriate, under the terms of the relevant legislation, public sewers to all properties which can be served at a reasonable cost. The use of spare capacity in existing services will be maximized and a high priority attached to servicing of Industrial sites.

High priority is also attached to the maintenance of existing systems giving particular priority to those areas where flooding may occur.

Provision of sewerage services for new developments can take place only where these can be supplied at reasonable cost to the Regional Council. Where services cannot be provided within a period of four years, a request for planning applications would be refused.

The Regional Council will ensure that, in consultation with Tay River Purification Board, where public sewerage facilities cannot be made available, adequate private arrangements are made. In the case of the provision and maintenance facilities for the treatment of sewage, the Regional Council will provide sewage treatment works, where appropriate, giving priority to those areas where health hazards are most likely to occur, and also provide where appropriate, sewage outfalls. The Council will attempt to maximize the use of spare capacity in existing services. A high priority is attached to the Servicing of Industrial sites and also to the maintenance of existing systems. At reasonable cost, provision will be made for new developments and in consultation with the Tay River Purification Board, in the absence of public facilities for the treatment of sewage being available for new development, adequate arrangements be made by private developers.

To ensure the best use of the existing sewerage and sewage treatment facilities, and that existing pollution problems are not aggravated or new ones created, the Board have continued their close consultation with Regional Council as Local Sewage Authority and the District Council as Local Planning Authority. As a result of these consultations, these authorities are continuing to restrict development in those places where there are inadequate sewerage or sewage treatment facilities.

The capital estimates approved by the Council set out the priorities for sewerage and sewage treatment, however, as it is found from time to time that priorities change in the light of altered circumstances there should always be enough flexibility in the programme to allow for this. It is the intention of the Regional Council, through their settlement policy, to examine those areas which are most suited for early development, because of spare capacity in existing services, and to concentrate development in such settlements to an extent which would not cause a disproportionate increase in their population. Applications for planning consents relating to unserviced sites will be examined and in instances where the Council is unable to provide services within a period of four years, the Regional Council will normally request the District Council to refuse consent.

1.1.3.

Programmes and Budgets

In the preparation of the capital works programmes for sewerage purposes, the greatest difficulty has been experienced in determining which of the many necessary schemes should be nominated as of the highest priority to keep the total expenditure within the limits imposed by the Government in any particular year.

In general, the programme attempts to take account of the matters listed hereafter, in order of priority:

- (i) The improvement of existing Sewerage Services to ensure compliance with statutory obligations by eliminating periodic flooding, arising from inadequate sewerage. Schemes carried out under this heading would usually allow for reasonable future development.
- (ii) The provision of sewerage services for new housing and industrial development where this can be done at a reasonable cost.
- (iii) The replacement or complete renewal of existing sewers where existing services are severely affected.
- (iv) The improvement of effluent quality from sewage treatment works where this does not reach River Purification Board standards.
- (v) The improvement or replacement of sewage outfalls to prevent pollution of beaches and estuaries.
- (vi) The provision of public sewerage services for the first time to existing properties where this can be done at reasonable cost.

Table 1.1.3. shows the sewerage services programme for the Angus District with the corresponding capital expenditure for the years 1980 - 1986 (from the Tayside Regional Council Financial Plan of 1980).

1	2	3	4	5	6	7	8	9	10
Project/Nature of Expenditure	estimated								Estimated additional
insert date of approval to	total	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	later	full year running costs
start projects where appropriate) cost								years	excluding loan charges
Fosfor-castle street/Recil Hol.	350	44							--
Montrose Basin interceptor	2,102	220	50						10.6
Arbroath central area drainage									
PH.1 - short outfall	502	49							2.6
Carnoustie, Braefoot/Bruce Drive	318	80	2						--
Criemuir - Cortachy road extension									
Angle road	206	53	2						--
Arbroath-Sewer in Ladyloan	264	45	4						--
Arbroath Central Area Drainage									
ph-2 long sea outfall	1,900	650	781	30					1.1
Brechin trade effluent disposal	270			250	20				2.5
Fosfor Lour Road/the Vennel sewer									
Renewal	130			125	5				--
Brechin-North Latch road	44			42	2				--
Kirriemuir STW outfall	960			200	740	20			10.0
Kingsmuir Sewers	74			70	4				0.8
Kirriemuir-Trunk Sewer to STW	330				320	10			--
Arbroath-central area drainage									
Ph.3 pumphouse	3,300							3,300	--
Brechin STW	200							200	--
Montrose-outfall at Lifeboat	110							110	--
Station	13							13	--
Edzell STW	55							55	--
Muirdrum STW	60							60	--
Tannadice	--							--	--
Newbigging	--							--	--
Criemuir-Gairie Bum	--							--	--
	11188	1141	839	717	1091	30		3738	27.6

1.2.1. Sectoral Methodological Approach

The preliminary preparation for the fieldwork included the analysis of the available sources of information about Angus District in terms of development problems, development goals and objectives for sewerage systems and sewage disposal.

The development policies, programmes and budgets including the development constraints for the future were studied.

The present situation in the 43 parishes showed inadequacy of sewerage and sewage facilities for further development. The requirements in some of the parishes such as Montrose, where the sewage is sea outfall without treatment, has caused severe constraints on the mains services, Carnoustie has severe limitations in the capacity and availability of sewerage facilities. The older inner town sewerage net work and the trunk sewer are basically incapable of accepting any further substantial new development and the upgrading and/or replacement of this network would be cost prohibitive in terms of economic relations.

This situation is the same in most other parishes.

During the actual fieldwork in Angus District, information was sought from the Tayside Regional Council and the Angus District water services in Forfar and information was available on the following:

- Location of sewage treatment works
- Type of treatment (full, partial or no treatment at all)
- Type of sewerage pipe system (separate system, part separate and combined system).
- Design capacity of treatment works
- Actual flow of sewage effluent
- Population served in relation to total population in parish.
- Standard of effluent (B.O.D. and S.S. ppm).

1.2.2.

Data Collection

Collection of data on the items listed above was one of the main activities of the sewerage and sewage group. The total sewerage pipe work in Angus District is estimated at 339 km.¹ The office noted that some areas use the separate system of sewage disposal where the pipework for stormwater disposal is different from the pipework for soilwater from the homes. In other cases, part of the area uses the separate system and part uses the combined system, while most areas use the combined system. The combined system is where both the stormwater and the soil water pass through the same pipework to the sewage treatment works.

The separate system, though better than the combined system, is more costly.

The works on high elevations depend on gravity and those on flat ground are pumped.

From the papers collected from the Forfar office of the Angus District, all the information sought was obtained.

1.2.3.

Data Analysis

In analysing the available data on sewerage and sewage, it is necessary to state the standards laid down by the River Purification Board as standards applied to effluents under different conditions.

(A) Non-tidal waters.

As a working for classifying the majority of sewage effluents and for formulating the terms of consent for sewage effluents, the following standards have been used:

- (i) The permanganate value (P.V.) in 4 hours at 27° C shall not exceed 20 parts per million.
- (ii) The Biochemical Oxygen Demand (B.O.D.) in 5 days at 20° C shall not exceed 20 parts per million.
- (iii) The solids in suspension (S.S.) dried at 105°C shall not exceed 30 parts per million by weight.

1) Forfar Sewerage Office of Angus District.

(iv) The PH value shall not be less than 5 or greater than 9.

In the case of plants providing full treatment except for the settlement of filter effluent, it is expected that, if a sample of the effluents is given quiescent settlement for one hour, the supernatant liquid shall conform to the standards.

Septic tanks or plants providing sedimentation are expected to discharge an effluent with less than 100 parts per million solids in suspension. Effluents discharging to watercourses which have less than 8 volumes of water as dilution have to conform to more stringent standards.

In the case of trade effluents, no effluent standards have been adopted except for a general standard for sand-washing plants that the solids in suspension shall not exceed 60 parts per million by weight. Trade effluents vary so much that it is impractical to adopt rigid standards, each case is therefore considered in relation to local conditions.

The main consent conditions generally imposed by the Board on discharges of effluents from fish farms are as follows:

- (i) The solids in suspension (ss) dried at 105° C do not exceed 15 ppm by weight.
- (ii) The Biochemical Oxygen Demand in 5 days at 20 ° C does not exceed 4 ppm by weight.
- (iii) The free and sline ammonia expressed as N shall not exceed 0.6 parts per million.
- (iv) The dissolved oxygen shall not be less than 80% saturation
- (v) The discharge shall not contain matter which is toxic to fish or other aquatic fauna.

(b) Tidal waters.

Where effluents have been required to receive settlement and in certain cases also secondary treatment the following working standards have been used:

- (i) The solids in suspension dried at 105°C shall not exceed 180 parts per million by weight
- (ii) The Biochemical Oxygen Demand (B.O.D.) in 5 days at 20°C shall not exceed 100 parts per million.

In analysing the collected data on sewerage and sewage for the present situation and for potential for further development, this public utility service has a very strong relationship to the population of each parish. It is therefore essential to note whether the design capacity of the sewerage works, where it exists, is for the total population, or for a certain percentage of the population and whether the population served in each parish is large or small.

In Arbroath, the total population is 24,284, the population served is 23,000, hence the percentage population served by the works is 95%. Looking at the works itself, the design capacity is 2,543,000 l.p.d., the actual sewage flow is 3,601,000 l.p.d., which shows an overloaded sewage works.

In Monikie, the total population is 826, the population served by the works is 200, - hence the percentage population served is 24%. Looking at the works, the design capacity is 76000 l.p.d., the actual flow is 43,000 l.p.d., this shows a spare capacity in the works.

Those two examples may convey a very wrong impression of the actual situation. In the case of Arbroath, the works is serving a large number of people and quite a high percentage of the population, while in the case of Monikie, the works is serving a small number of people and a very low percentage of the population and the seemingly spare capacity of works in Monikie would definitely disappear if the works serves the population of 826 instead of 200. This shows that the situation of Arbroath is not bad at all considering the large percentage of the population served by the works.

In considering the sewerage and sewage services therefore, spare capacity of works is examined critically in relation to the actual population served out of the total population of the parish.

The actual situation could have easily been seen if in each parish the entire population has been served by the works so that the potential for further development can easily be determined.

For the analysis of the collected data, the items were considered one by one as follows:

- Ratio of population served to the total population of each parish

- Type of sewerage system:
 - Separate system has rating of 1.0
 - Part-separate system has rating of 0.6
 - Combined system has rating of 0.4
- Type of sewage treatment
 - Full treatment has rating of 1.0
 - Partial treatment has rating of 0.5
 - No treatment has rating of 0.1
- Spare capacity - This is calculated as design capacity over the actual flow in litres per day.

The ratings above are used to express the conditions or to quantify the types of sewerage systems and sewage treatment e.g.

rating of 1.0 is very good

" " 0.6 is good

" " 0.4 is marginal/bad

and in the case of treatment;

rating of 1.0 is very good

" " 0.5 is good

" " 0.1 is bad

The product population ratio x spare capacity x type of system x type of treatment, gave the final figure of the whole system of sewerage and sewage in relation to the population served in each parish where works are located. (See table 1.2.4.a.).

The parishes with septic tanks cleaned regularly by the council are rated high because a regularly cleaned septic tank has no problems of pipe work and overloaded sewage works and so has pollution free surroundings. The septic tanks in the parishes not cleaned by the Council are however rated lower.

As a whole, the level of sanitation in each of the 43 parishes in Angus District is quantified for the purposes of homogeneity analysis as shown in table 1.2.4.b.

For the index numbers, the final figures were arranged as follows:

	<u>Score</u>	<u>No. of parishes</u>
0 - 15	1	4
15 - 20	2	6
30 - 45	3	7
45 - 60	4	11
over 60	5	15

The above figures lead to the homogeneity map of sewerage and sewage facilities in the 43 parishes of the District. The figures without score were used in the factor analysis for homogeneity using the computer.

1.2.4. Contributing variables to Homogeneity

From the data collected, it was observed that the contributing variables to homogeneity would be the following:

- ratio of population served to the total population of each parish.
- spare capacity of treatment works
- type of sewerage system
- type of sewage treatment

Sewerage/sewage facilities (sewerage quality)

	<u>Value</u>	<u>Score</u>
1. Arbirlot	6	1
2. Arbroath	20	2
3. Aberlemno	20	2
4. Airlie (s)	70	5
5. Brechin	43	3
6. Barry/Carnoustie (see outfall)	40	3
7. Careston (s)	70	5
8. Carmyllie (s)	70	5
9. Cortachy/Clova (n)	60	4
10. Craig	15	1
11. Dun (w)	40	3
12. Dunnichen	39	3
13. Edzell	50	4
14. Eassie/Nevay (s)	70	5
15. Forfar	68	5
16. Fern	8	1
17. Farnell	70	5
18. Glamis	60	4
19. Guthrie (s)	70	5
20. Glenisla (n)	60	4
21. Kinnettles (n)	60	4
22. Inverarity (w)	40	3
23. Kirkden	57	4
24. Kingoldrum	70	5
25. Kirriemuir	48	4
26. Inverkeilor	17	2

	<u>Value</u>	<u>Score</u>
27. Kinnell (s)	70	5
28. Lethnot/Navar (s)	70	5
29. Loch Lee (n)	60	4
30. Logie Pert (n)	60	4
31. Lintrathen (n)	60	4
32. Lunan (s)	70	5
33. Menmuir (s)	70	5
34. Monikie	25	2
35. Maryton (s)	70	5
36. Montrose	40	3
(see outfall)		
37. Oathlaw (n)	60	4
38. Panbride	20	2
39. Ruthven (s)	70	5
40. Stracathro (s)	70	5
41. Rescobie	32	3
42. Tannadice	5	1
43. Newtyle	29	2

	Freq.	Score
0 - 15	4	1
15 - 30	6	2
30 - 45	7	3
45 - 60	11	4
60+	15	5
	<hr/>	
	43	

Chapter 3

I.3.1. Conclusions and recommendations

Based on the result of the homogeneity analysis and the hierarchization of centres, the following parishes are placed in order of priorities for development.

I priority areas for Urban Development:

1st priority:	Arbroath	- overloaded sewer
	Montrose	- sea outfall
	Forfar	- spare capacity
2nd priority:	Brechin	- overloaded sewer
	Carnoustie	- sea outfall
	Kirrimuir	- overloaded

II Priority areas for Rural Development:

1st priority:	Kirkden	- spare capacity
	Inverkeilor	- spare capacity
	Logie Pert	- septic tank
	Edzell	- overloaded
	Glamis	- spare capacity
	Dunnichen	- spare capacity
	Newtyle	- spare capacity
2nd priority:	Panbride	- overloaded
	Aberlemno	- spare capacity
	Arbirlot	- spare capacity
	Monikie	- spare capacity
	Craig	- spare capacity
	Carmyllie	- septic tank
	Inverarity	- to other sewers.

III Third priority for development - other parishes not included in the above list.

The sewerage and sewage facilities need improvement, in the case of urban areas for further development. The spare capacity shown in Forfar could not be there if the total population of the area is served by the works.

Forfar works serves only 56% of the total population and therefore improvement in the sewerage services is needed in order to accomodate further development.

In the case of rural areas, the services need to be improved in order to serve the total population in each parish.

In parishes where sewage treatment is partial, sewage treatment should be full to avoid pollution of the waters, where the sewage is disposed.

The sea outfalls in Montrose, Carnoustie and Arbroath which have no treatment, should have at least partial treatment to prevent pollution of the beaches.

References

1. Tayside Structure Plan 1979
2. Tay River Purification Board Report 1978
3. Report by the Scottish Council (Development and Industry)
4. Local plans for Forfar, Montrose, Carnoustie, Brechin, Kirriemuir, Arbroath
5. Papers on sewerage and sewage from Angus District Office in Forfar.

Sectoral References

1. Tayside Regional Council Structure Plan 1978.
2. Northern Scottish (SBA) Fare and stages no. 3
3. Northern Scottish (SBA) Time Table, April 1981
4. Comprehensive Guide to Public Transport (Forfar - Brechin - Montrose)
May 1980
5. SCOTMAP
6. Transport policies and programmes 80-85
7. Support information on t.p.p. 80-85
8. Transport Capital Works
9. The need for Rural Public Transport; P.A. Slantey/J.H. Farrigdon
10. Accessibility, Mobility of Transport Related Welfare - : S.D. Nutley

No	PARISHES	TOTAL POPULATION	POPULATION SERVED	POPULATION % POPULA- TION SERVED	DESIGN CAPACITY	FLOW CAPACITY	ACTUAL	RATIO	SEWERAGE SYSTEM				SEWAGE TREATMENT				TOTAL
									4 x 7	sep rate part seperate		combined full	partial	No treatment			
										9	10				11	12	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
1	ARBIRLOT	559	66	12	19000	15000		1.27	15.24	--	--	0.4	1.0	--	--	6	
2	ARBROATH	24284	23000	95	2543000	3601000		0.71	67.45	--	0.6			0.5	--	20	
3	ABERLENO	465	28	62	8200	5000		1.64	101.68	--	--	0.4		0.5	--	20	
4	AIRLIE	474	--	--	--	--		--	--	--	--	--	--	--	--	70	
5	BRECHIN	7624	6900	91	2273000	2864000		0.79	71.89	--	0.6		1.0	--	--	43	
6	BARRY/																
	CARROUSTIE	7561	6400	85	1687500	1152000		1.46	124.10	--	0.6	--	--	0.1	--	40	
7	CARESTON	142														70	
8	CARMYLIE	425														70	
9	CORTACHY/																
	CLOVA	315														60	
10	CRAIG	1263	300	24	91000	55000		1.65	39.60	--	--	0.4	1.0	--	--	15	
11	DUN	280	--	--	--	--										40	
12	DUNNICHEN	1130	70	66	19000	13000		1.46	96.36	--	--	0.4	1.0	--	--	39	
13	EDZELL	814	1150	141	182000	200000		0.91	128.31	--	--	0.4	1.0	--	--	51	
14	EASSIE/																
	NEVAY	335	--	--	--	--		--	--	--	--	--	--	--	--	70	
15	FORFAR	13511	11700	86	7137000	5455000		1.31	112.66	--	0.6	--	1.0	--	--	68	
16	FERN	469	21	4	7000	4000		1.75	7.0	--	0.6	--	1.0	--	--	4	
17	FARNELL	307	--	--	--	--		--	--	--	--	--	--	--	--	70	
18	GLAMIS	657	560	85	121000	102000		1.18	100.30	--	0.6	--	1.0	--	--	60	
19	GUTHRIE	197	--	--	--	--		--	--	--	--	--	--	--	--	70	
20	GLENISLA	330	--	--	--	--		--	--	--	--	--	--	--	--	60	
21	KINETTLES	202	--	--	--	--		--	--	--	--	--	--	--	--	60	
22	INVERARITY	499	--	--	--	--		--	--	--	--	--	--	--	--	40	
23	KIRKEN	812	1000	57	456000	182000		2.50	142.50	--	--	0.4	1.0	--	--	57	
24	KINGOLDRUM	211	--	--	--	--		--	--	--	--	--	--	--	--	70	
25	KIRRIEMUIR	5642	5000	88	909000	1000000		0.91	80.08	--	0.6	--	1.0	--	--	48	
26	INVERKEILOR	681	266	39	51000	48000		1.06	41.34	--	--	0.4	1.0	--	--	17	
27	KIMNELL	578	--	--	--	--		--	--	--	--	--	--	--	--	70	
28	LETHNOT/ NAVAR	101	--	--	--	--		--	--	--	--	--	--	--	--	70	

No	PARISHES	TOTAL POPULATION	POPULATION SERVED	% POPULATION SERVED	DESIGN CAPACITY	ACTUAL FLOW CAPACITY	RATIO	4 x 7	SEWERAGE SYSTEM			SEWAGE TREATMENT			TOTAL
									seperate	part seperate	combined	full	partial	No treatment	
1		2	3	4	5	6	7	8	9	10	11	12	13	14	15
									1.0	0.6	0.4	1.0	0.5	0.1	
29	LOCH LEE	N	129	--	--	--	--	--	--	--	--	--	--	--	60
30	LOGIE PERT	N	557	--	--	--	--	--	--	--	--	--	--	--	60
31	LINTRATHEN	N	315	--	--	--	--	--	--	--	--	--	--	--	60
32	LUNAN	S	255	--	--	--	--	--	--	--	--	--	--	--	70
33	MENMUIR	S	405	--	--	--	--	--	--	--	--	--	--	--	70
34	MONIKIE	--	826	24	76000	43000	1.76	42.24	0.6	0.6	1.0	1.0	--	--	25
35	MARYTON	S	--	--	--	--	--	--	--	--	--	--	--	--	70
36	MONTROSE	S	10290	--	--	--	--	--	--	--	--	--	--	--	40
37	OATLAW	N	297	--	--	--	--	--	--	--	--	--	--	--	60
38	PANBRIDE		1644	155	12000	19000	0.63	97.65	--	--	0.4	--	0.5	--	20
39	RUTHVEN	S	126	--	--	--	--	--	--	--	--	--	--	--	70
40	STRACATHR	S	746	--	--	--	--	--	--	--	--	--	--	--	70
41	RESCOBIE	--	372	60	19000	14000	1.35	81.00	--	--	0.40	1.0	--	--	32
42	TANNADICE	--	595	20	35000	30000	1.16	23.20	--	--	0.4	--	0.5	--	5
43	NEWTYLE	--	841	95	339000	218000	1.55	147.25	--	--	0.4	--	0.5	--	29

S = Septic tank cleaned by council

N = Septic tank not cleaned by council

SECTORAL REPORT J

ROADS - TRANSPORT AND COMMUNICATION

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Sectoral Survey Report

J. Transport and communication

Introduction

The welfare of rural communities depends to a large extent on standard of mobility and accessibility to services.

Every society contains a series of activities that represent a pool of resources from which individuals can derive benefit. If an individual does not have accessibility to these resources, then his/her real income is reduced - a chain reaction in reduction of economic growth of that society or community. Transport and roads availability are a controlling factor determining this accessibility.

This sectoral survey was designed to enumerate the physical, spatial and social spread of accessibility to development activities in Angus District.

J.R. Roads

J.R.1.O. Present Situation

The physical accessibility of Angus District can be determined from the availability of road networks to every part of the district, including farmlands, scenery, industrial zones and residential settlements.

The provision and maintenance of an adequate and integrated road network system is essential for economic growth and social well-being of the society. The present situation reveals that Angus district is fairly provided with road-network, railways and two ports of importance. The spatial distribution of these facilities is to be determined in the survey.

Road networks within Angus District at present consist of a trunk road (A 926 - A 94) from Dundee to Aberdeen, running through Gateside - Forfar - Brechin in the project area. Similarly, a strategic road "A 92" passing through Arbroath - Montrose. A group of "A" class and "B" class roads radiating from the major towns to strengthen and connect the rural villages with one another, while a number of principal roads and unclassified roads increase the density of the road network.

The present situation reveals more road network in the South-Angus Lowland compared to North Angus highland areas (see diagrams J.R.1.a.). Though the roads are being used and maintained for years, some have developed a number of problems as stated in sec. J.R.1.2. However, they are all under-utilized and when comparing the road quality with road usage, none is above 50% utilization range.

J.R.1.1. Development Problems

The Regional Council's goal as regards roads has been stated in the general report as the provision and maintenance of accessibility of people and economic products. The problems facing roads development in Angus District are similar to those of the Tayside Region as a whole. Even though the nature, the location and the use of each section of the roads pose specific problems. Methods of provision of solution are equally met with constraints, as explained in sec. J.R.1.4. of this report.

The above stated goal has been translated into a set of objectives which are used to classify the problems in order to establish broad road programmes. These include:

1. The maintenance of the existing road network and ensuring essential links.
2. The development of localized schemes essential for industrial and commercial access and for accessing residential sites.
3. Relief of congestion and delays and improvement of environment and safety.
4. Economy of infrastructure and plants.

The problems: 1. The problem of maintenance of Accessibility. There are a number of roads and bridges which require major improvement work due to age of structure and inadequate maintenance in the past. In rural areas the maintenance of access roads is vital to the continued functioning of the social economic life of the rural population. Failure to maintain accessibility will therefore contradict the policy on rural depopulation and employment.

In urban areas, e.g. Montrose-Arbroath-Brechin, the age of the road structure and nature of the access roads are not adequate for present needs.

The narrowness of roads with on-street parking, gives rise to a lack of free vehicular access even in emergencies.

Table J.R.1.2.a. gives a list of all roads and highways within Angus District with problems requiring more than £50,000 capital budget. Other road problems include:

The problem of monitoring emergency problems on highways during winter time. Lack of adequate roadside facilities. Environmental hazard and disturbance of tight thorough traffic, affecting settlement especially along A22.

The proper method of classification of the roads is very important since some roads which could have been underclassified and hence undermaintained. All these are some of the problems concerning the effective development and maintenance of roads accessibility within the Angus District.

J.R. 1.2. The development Policies

All road networks within Angus District are directly controlled from the Regional Council. The trunk road which is the direct responsibility of the central government is still handled by the Regional Council as agents for maintenance and improvement purpose. The council has to formulate a series of development policies based on the development goals and objectives related to transports as earlier stated (see general report chapter II 2.2., and J.R.1.2.) in this survey report.

The following are the stated development policies:

1. The accessibility of the rural area of Angus District should be maintained and where appropriate - improved.
2. To permit roadside services on the strategic and trunk roads.
3. To selectively restrain the volume of traffic using a limited number of key routes and location within.
4. To examine all proposals for new roads or road improvements in the light of need and the financial resources available.
5. To ensure that adequate measures are taken to keep accidents resulting from road traffic at a minimum.
6. Ensure that in seeking solutions to road problems, the requirements of the visual and social environment are fully considered.
7. To ensure that car parks are adequately provided and the balance of account of operation and maintenance cost be levelled with revenue derived.

LIST OF EXISTING ROAD PROBLEMS IN ANGUS DISTRICT.

REQUIRING WORK OVER £50,000

TABLE J.R. 1.2A.

No	Map Ref.	Road	Description	Landuse affected	Usage	Acci- dent	Type of problem
1.	No 5235	A 92	Ward hill/grange of Barry Road Improve	Agric	8,500	0	Poor alignment on high speed busy route
2	No 5637	A 92	Muir Drum Bypass	Resi/Agric	8,000	2	Poor alignment, environment, and parking problem. Bad junction.
3	No 6544	A 92	Tarrig Bank Bend improvement	Agric	5,000	0	high speed busy route. Poor alignment.
4	No 6544	A 92	Marywell Bypass	Resi/Agric	5,000	0	Enviro Problem, high speed busy route.
5	No 6649	A 92	Inverkeilor Bypass	Resi/Agric.	5,000	0	Poor align., environment, Restricted headroom Bridge, Poor Junction
6	No 7262	A 92	Lower North Bridge Improvement	Agric.	5,000	0	Poor alignment, restricted width, delay hgv
7	No 6659	A935	Mill of Dun Realignment	Agric.	2,500	4	Poor alignment and width, heavy seasonal traffic.
8	No 3346	A 94	Castleton of Eassie Imp.	Agric.	6,000	1	Poor alignment, high speed route
9	No 5334	A930	Bary Relief Road	Resid.	4,000	4	Severe Environment, Poor alignment, restricted width
0	No 5336	A 92	Panbride/East	Agric.	2,000	0	Restricted width, poor junction
		A930	Carnoustie Link				
1	No 5450	A932	Mill Bends Division	Agric.	2,000	1	Poor alignment, awkward junction
2	No 6060	A933	Brechin East Link Road	Agric./Resi	2,000	2	Poor alignment, long term development
		A935					
3	No 6655	A 934	Bennyton Realignment	Agric.	1,500	0	Poor alignment and width
4		A 92	Arbroath Railway Bridge	Comm./Resi.	5,000	0	Restricted headroom/Poor alignment
5	Arbroath Urban Area	A 92	Arbroath North End	Resi	5,000	9	Safety, environment problem, alignment
6			Condor/Kirkton Road	Resi	2,000	0	Alignment and capacity (width)
7			St. Vigens Bypass	Agric./Resi	2,000	0	Safety, alignm. environment problem
8		A 92	New Bridge Improve	Comm./Resi	1,000	2	Need repair, /maintenance
9	Montrose Urban Area	A 92	Montrose Inner Relief	Resi	5,000	8	Capacity, safety, environment
0			Harbour Access Road	Resi/Conn.	1,000	1	= do =
1		A 92	Condour Crescent/Ward Rehouse	Resi./Comm	NA	-	Construction for accessibility
2			Western Road	Comm./Resi.	NA	-	Necessary for Development
3	Brechin		Car Park				
4			Central Aveg	Comm./Resi.	NA		Safety/Environment
5			Pedestrian				
6	Forfar		West Field Road Imp.	Agric./Comm.	1,000		Necessary Improvement
7	Kirkcubbin		Ballix Burne/	Resi./Comm.	NA		Safety / Environment
8			Tanage Brae Relief				

8. To make specific allowance in road budgets for servicing up to industrial sites.

Most of these policies are translated into programmes as the TPP and the capital work programme and stand as the functioning of the Road Department, which are summarized in J.R.1.5.

J.R.1.3. Development Impediments and constraints

The major constraint facing the road network and highway development in Angus District is simply that of finance.

1. The Central Government policy has been clearly spelt out as that of costs in Public Spending. This coupled with inadequate financial assistance, constitutes the main constraint towards road development programmes.

Other constraints include:

2. Increase in the price of road building material particularly bituminous materials to a far greater extent than the average cost of living index.
3. Continuous public concern on road problems, since people are not willing to accept poorer standards of road maintenance.
4. The present, ill-defined method of classification is a constraint to priority placing of road programmes for improvement.
5. Inadequate staff during heavy winter for road clearance.

All these represent some of the constraints to development of roads for physical accessibility of all parts of the Angus District.

J.R.1.4. Roads Projects and Programmes Development

1. The District is divided into 2-zones, Angus North and Angus South for the purpose of maintenance and improvements. The activities of the maintenance section include: (i) Maintenance of all roads and highways (ii) Construction of minor-roads problems, with limitation to maximum length of 1.5 km. (iii) Conduct annual survey to determine roads carrying capacity and quality. (iv) Operation of night patrol system with constant report to the zone headquarter of any problem.

2. The planning section is involved in the Development of capital programme. The process of arriving at draft capital programme includes:

1. Assembly of a list of all roads with known and anticipated problems after a survey.
 2. Relating each problem to the priority of the council formula of operation.
 3. Making preliminary decisions on type of solution appropriate to each problem and estimate cost of the work.
 4. Estimate the level of fund likely available for roads capital work during the plan period.
 5. Develop alternate programmes for the allocation of the available funds by selection from all problems for expenditure. A final recommendation of one of the alternatives for adoption.
 6. The process of arriving at a list of problems was largely developed by consensus of opinion of the Road Specialists, the planners and Users.
- The Engineering section is operating a comprehensive computerized system of accident recording. The statistical results and reports of this accident recording are used to make Economic Assessment of road network schemes, Justification of Junction improvement, road safety, planning, maintenance and monitoring of all road programmes and development process.

J.T. TRANSPORT (PUBLIC)

J.T.1.O. Present Situation

The provision and maintenance of an adequate and integrated public transportation system, is essential for economic growth and social well-being of the people of Angus District, within Tayside Region. Angus District is fairly well served with public and private bus services and a complementary coastal rail-service. Even the most remote part of the District e.g. Glen Clova, is within 1½ hr travel time to Dundee City and Airport by bus. The spatial distribution of these services is the subject of survey, the result which is in chapter J.2.5. of this report. The Tayside regional council is directly responsible for promoting and coordinating all forms of public transport within Angus District. Bus services are provided by the Scottish Bus Group (SBG) Northern. Mc. McIcan, the Greyhound and Community Bus services are private ventures, also the postbus operates in the glen areas mostly. The British Rail is responsible for train services.

In order to meet their goal, which is the provision and maintenance of public accessibility to bus services to meet the economic and social need of the population, even to the most remote areas, the Regional Council

- (i) Directly operate some bus services
- (ii) Directly reimburses and coordinates the Scottish Bus Group and some private bus operators.
- (iii) Take annual decision on provision of subsidies to unprofitable routes operated by various public and private bus operators.
- (iv) Development of transport policies for the region to which the Transport Commissioner takes decision.
- (v) Invest directly in improvement of Public Transport facilities.

Development Progress

Some developments and innovations have taken place since the last report on the structure plan of 1978.

In most of the report, various problems are recorded facing transportation. Such as lack of cooperation, coordination, non-provision of service to remote areas etc. Changes that have taken place include:

1. Increase cooperation between regional council and bus operators
 - (ii) Coordination between the Public and Private operators in terms of time table and fare changes has been improved.
 - (iii) Introduction of shopper bus services to some remote areas such as the parishes of Rescobie, Tannadice, Oathlaw and Aberlemno.
 - (iv) Increase use of post buses to the remote areas such as the Glens of Glova.
 - (v) Increase in fare has been introduced in order to cope with the inflation on cost of operation.
 - (vi) The British Rail passenger services are adequate as at present and no change in current level of service is anticipated, unless sudden developments take place at Buddon Barry (SDA).
 - (vii) The Scottish bus group, responsible for provision of public bus services, has initiated a market oriented project called SCUTMAP. The project is to carry out a survey and analysis to solve the problems of public transportation in operating areas. A brief summary also of SCOTMAP is given in section J.T.1.21 of this report.

J.T.1.1.

Development problems

Angus District has 3 major types of problems facing transportation.

1. Its distance from the main Scottish and U.K. centres of population is a problem for market and supplies if growth is to be encouraged to create good external transport arrangements.
2. The provision of passenger service for local communities to meet economic and social needs of the population is still a problem.
3. The urban congestion associated with increased use of private cars for work and shopping is the third major problem.

This survey focuses mostly on the last 2 problems within the local area of Angus District. It concentrates mostly on how to integrate the issue of accessibility of the rural population and other factors of growth such as Industry, Service, Agriculture etc. towards Development of the District.

Other Development Problems can further be broken down as follows:

1. Problems of maintenance of adequate level of public bus services in the light of government policy of cuts in public expenditure.
2. The increased cost of operating the bus services and purchase of vehicles.
3. Problem of coordination between private-public of B-Rail.

4. Lack of bus services to the remote areas, especially the upland areas to meet their social needs.
5. Lack of recognition of the role of responsibility of the Regional Council by some bus operators.

J.T.1. 3.2.

Development policies

Based upon the Development Goals and Objectives as stated in General Report Chapter II and J.T.1.1. of this sectoral report, the following are the translated policies as regards Public Transport.

1. To ensure that public transport will provide a comprehensive service whenever possible as a social measure to preserve the mobility of that sector of the community, which has no private means of travel (The Total Public Transport Dependency People).
2. To ensure that public transport revenue will cover the cost of operation except where socially necessary services remain unremunerative after all reasonable measures of economy have been implemented.
3. To provide Public Transport Service which will play a major role in accomodating peak hour journeys where resistant to private traffic is deemed necessary.
4. To provide high standards of weather protection for bus passengers at stops.
5. Establish vehicle parks and interchange facilities and reschedule bus facilities at key locations, especially the parishes.
6. To encourage increased use of existing rail services.
7. To examine all transport proposals in the light of cost/benefit attaching to a reasonable alternative solution.
8. Endeavour to halt the decline in Public Transport Service in rural areas by an improvement of these services without any overall control of the proportion of journeys by various forms of transport.
9. To stimulate and encourage private bus operations and unconventional operational in rural areas to expand by making maximum use of school transport, postbus and community buses.

J.T.1.3.

Development Impediments and Constraints

One major constraint to Development and maintenance of Public Transport in Angus District is that of inadequate finance. Concern is felt about the overall level of finance available to cope with the problems facing the Tayside Council, which is also responsible for Angus District, both immediate and forgone years.

Details of financial allocation and projection for public transport are in Sectoral Report K. Other bottlenecks include:

1. The physical inaccessibility of some remote areas, due to relief and lack of good class roads, especially in the Angus North Zone of the highlands.
2. Increase use of private cars ; reduce patronage of some bus services leading to possible withdrawal of some bus routes.
3. Lack of adequate parking spaces in urban areas of Arbroath-Montrose-Forfar.

J.2.

The Survey "Towards Priority Areas"

Due to the interrelationship between physical provision of roads with public transport and usage of the roads network, a combined Methodological Approach was used in collecting data, analysing and differentiation of the homogenous zones towards priority areas.

J.2.1.

Sectoral Methodological Approach

The methodological approach is directed towards determination of the physical accessibility of the smallest unit of division within the District called the parishes. This was done in 2 ways

- (i) by determining the physical provision of roads and railways for the rural population and farmland.
- (ii) by giving special priority to the roads relating to the quality and strength.

The other approach which is much more socio-economic in nature is determination of accessibility and mobility of the rural population as regards provision of bus services to and from the urban commercial and main service centres and working places.

J.2.2.

Collection of Data, existing and non-existing

Data requirements for the purpose of determination of physical and socio-economic accessibility of the district at parish level include:

1. Total length of roads in km. within each parish
2. The size of each parish in hectare
3. The nature or the classes of the roads
4. The number of bus services and frequencies to various parishes
5. The frequency of peak hour bus services.
6. The percentage of population in total dependency zones.
7. The population of each parish

All these are to be related to the total population.

8. No. of postal services per parish

Existing data:

Almost all the data requirements for this sectoral survey are available directly or derived from various other documents. The road length and their classes are obtained from 1976 edition of topographic maps at scale 1:50,000 covering the District. All bus services and frequencies are derived from the time table. Table of Journey route and fares as published in 1980 (see references). All the post offices and postal agents spatial distribution per parish are obtained from the post office in Dundee. The data on parish size and population are extracted from the computer print-out available.

Non-existing data:

Data on spatial distribution of the public telephone boxes are not available at parish level, but at planning zone level and therefore difficult to break down to parish level.

J.2.3.

Data analysis

The available data are analysed in 2 ways

- (i) For the purpose of arriving at homogenous zones among the parishes in terms of the spatial distribution of factors for accessibility.

More details about this can be found in J.2.4.

(ii) For the purpose of ranking the urban and rural centres in a system of hierarchy of importance and key positions towards development.

See J.2.5. and chapter III 3.2. of the main report.

The Analysis:

The data for physical accessibility by road provision were analysed as follows:

All the road network within each parish was scaled in km of length and arranged according to quality by classification. Trunk and A roads = "A", B and principal road = "B", others = "C". The sum of all roads was related to size to find road density/parish. Then a priority rating was given in arbitrary ratio 3-3-1 of A, B, C respectively and the resulting value related to population.

The data on socio-economic accessibility by provision of public bus service was analysed as follows:

The number of bus stops and frequency per parish were extracted from the time table, and the sum of all frequency is used as a factor for arriving at spatial distribution. It was later related to the rural population (Rural population of urban parishes was obtained by subtracting the total population from the township population).

The availability of peak hour services was also differentiated by limiting peak hours to 7 am - 9 am and 4 pm - 6 pm daily.

The total public transport dependency ratio was obtained by subtracting the number of households with cars from the total number of households per parish. The analysed data are available in tables J.2.4.a. and table J.2.4.b. Further explanations on data for homogeneity analysis in Section J.2.4.

Data analysis for centre ranking was derived as follows:

(i) The number of roads by class, radiating from these centres to others, making it accessible to other centres and near by rural settlements.

Priority to class is recommended for the sector responsible in determining the rural centers hierarchy.

(ii) The number of bus services calling at these centres per day.

(iii) The No. of post offices or agencies operating in that centre

All these are presented in table J.2.5.a. and further information on rural centre hierarchy from chapter IV 4.2. and J.2.5.

J.2.4.

Contributing variables to homogeneity

Based on methodological approach which is the determination of the physical and socio-economic accessibility of the District at parish level.

The following variables were used for the purpose of arriving at homogenous distribution of transport facilities within the District. 3 of these are latter input for computer processing in factor analysis.

1. Road density in km/km² refer to fig. J.2.4.a.
2. Population ratio/km of road with priority to quality - Fig. J.2.4.b.
3. Total frequency of daily bus service - Fig. J.2.4.c.
4. Total public transport dependency/daily service - Fig. J.2.4.e.
5. Population/Bus service - Fig. J.2.4.d.
6. Provision of peak hour bus services - Fig. J.2.4.f.

The reference figure in front of these variables represents the synthesis map of indication.

The result of these variables and the result after comparison with other socio-economic variables and physical infrastructure variable are presented in Sec. J.2.6. and also at chapter IV of the main report.

J.2.5.

Contributing variables to hierarchization

In order to determine the relative importance and potential towards development in terms of economic growth and provision of services to surrounding settlements, various centres within the District need to be ranked. From the Road and Transport sectoral investigation, the following variables are deemed necessary in determination of these rankings:

1. The physical provision of roads to these centres making it accessible to other places. - This is done by counting the number of roads radiating from it to other settlements, spatial priority being given to the quality of road represented by classes.
2. The second variables used is that of Public Transport availability and its frequency. The number of times a day that bus stops in this centre determines its accessibility and importance compared to others.
3. The third variable provided is that of provision of postal services, the centres with post offices and postal services are regarded to be more important than those agricultural.

		Area (ha) x1000	Population	"A" class road	"B" class road	"C" class road	Total road network/ parish	Road density	Ranking for road density	Sum road figure priority for qual. A=5, B=3, C=1	Ratio of road density/area	Quality ranking	Population/road (quality rating)	Ranking of population/road
A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
1	Barry	2.15	5429	7.3	9.3	2.5	19.1	8.9	3	67	31	3.1	4.1	3
2	Panbride	2.47	1644	11.75	12.7	2.0	26.5	10.7	3	99	40	4	16.6	1
3	Arbirlot	2.71	557	5.75	23.7	6.3	33.7	12.2	4	104	38	4	5.4	2
4	Arbroath	5.10	42,120 (1099)	17.5	56.4	10.3	86.2	16.9	5	269	52	5	4.1	3
5	Inverkeilor	4.13	681	4.7	36.0	29.5	70.1	17.0	5	161	39	4	4.2	3
6	Lunan	1.13	254	5.1	11.0	6.3	22.4	19.8	5	65	58	5	3.9	4
7	Kinnell	2.79	575	6.0	19.2	17.7	42.9	15.4	4	105	37	4	5.5	2
8	Kirkden	2.19	812	5.1	17.2	12.9	35.2	16.1	5	90	41	4	9.0	1
9	Carmyllie	3.03	423	4.7	26.3	14.5	45.5	15.0	4	117	39	4	3.6	4
10	Monikie	3.56	823	2.9	31.5	23	57.4	16.1	5	131	37	4	6.3	2
11	Craig	1.74	1,244	4.4	17.9	4.8	27.1	15.5	4	81	47	5	15.4	1
12	Maryton	0.93	135	3	7.7	2.7	13.4	7.5	2	41	44	4	3.3	4
13	Dun	1.75	276	6.4	7.5	8.1	22	9.6	3	63	35	3	4.4	3
14	Montrose	1.80	11,610 (444)	10.0	16.0	5.2	31.2	17.3	5	103	57	5	4.3	3
15	Logie-Pert	2.30	565	5.7	15.6	18.0	39.3	17.1	5	93	40	4	6.1	2
16	Stracathro	2.10	757	2.3	14.7	11.0	30	14.3	4	66	31	3	11.5	1
17	Brechin	5.62	7,500 (307)	15.3	34.7	20.5	70.5	12.5	4	201	36	4	1.5	5
18	Farnell	2.31	312	5.8	7.0	7.0	19.8	8.5	3	57	25	2	5.5	2
19	Careston	0.33	144	2.3	2.1	5.6	10.0	11.8	3	24	28	3	6.0	2
20	Menmuir	4.33	411	0	24.4	15	39.4	9.1	3	88	20	2	4.7	3
21	Lehtnot and Navar	10.7	103	0	21.3	2.3	23.5	2.1	1	65	6.1	1	1.6	5
22	Edzell	7.65	826	0	19.0	6.3	25.3	3.3	1	63	8.0	1	13.1	1
23	Loch Lee	23.63	131	0	16.0	1.3	17.3	0.73	1	49	2.0	1	2.7	5
24	Aberlemno	3.60	467	1.8	26.1	9.5	37.4	10.4	3	94	20	2	4.9	3
25	Guthrie	1.13	198	2.8	11.6	6.0	20.4	18.0	5	54	49	5	3.6	4
26	Rescobie	2.50	373	9.7	13.0	17.5	40.2	16.0	5	105	42	4	3.6	4
27	Dunnichen	1.66	1,135	5.4	14.3	8.5	28.5	17.0	5	78	47	5	14.6	1
28	Inverarity	4.49	501	7	29.9	19.5	56.4	12.6	4	85	19	2	5.9	2
29	Forfar *	3.40	12,025	17.85	29.5	19.0	66.4	19.5	5	196	58	5	1.5	5
30	Kinnettles	1.25	203	4.1	7.8	8.3	20.2	16.1	5	68	54	5	20	5
31	Glenisla	5.79	660	14.4	22.5	10.0	46.9	8.1	3	14.9	54	5	4.4	3
32	Newtyle	2.10	844	5.1	11.5	4.0	20.6	9.8	3	64	30	3	13.2	1
33	Eassie	2.02	336	4.0	13.0	4.0	21.0	10.4	3	63	32	3	5.3	2
34	Ruthven	0.94	127	4.0	3.3	4.5	11.8	12.5	4	35	31	4	3.7	4
35	Airlie	3.60	476	6.5	29.6	8.9	45.0	12.5	4	130	36	4	3.6	4
36	Kingoldrum	3.88	212	0	21	6.5	27.5	7.1	2	70	18	2	3.0	5
37	Kilriemuir	6.07	5078 (121)	13.1	48.4	26.0	87.5	14.6	4	235	39	4	0.5	5
38	Oathlaw	2.14	298	6.5	16.4	5.0	28.9	13.5	4	87	39	4	3.4	4
39	Tannadice	8.62	597	1.3	33.3	12.0	46.5	5.4	2	118	14	2	5.0	3
40	Fern	3.56	470	0	11.8	6.5	18.3	5.1	2	65	7	1	7.2	2
41	Glover	25.45	316	0	46.0	4.4	50.4	2.0	1	142	6	1	2.2	5
42	Lintharthen	9.06	316	0	29.0	9.0	38.0	4.2	1	96	10	1	3.3	4
43	Glenisla	16.67	331	0	39.7	15.3	55.0	3.3	1	138	8	1	2.5	5

	Names of parishes	No. of points of bus stops/parish	Total bus frequency daily service	Ranking of daily service	Peak-hour daily bus service	Ranking of peak-hour	Population served per bus service (pop.bus-daily)	Ranking of pop. daily/bus	Total households per parish	No. of households with cars	Public bus dependent, service	Ranking of bus dependent/service
A	B	C	D	E	F	G	H	J	K	L	M	N
1	Barry	3	68	4					1973	785		5
2	Panbride	4	64	4	16	4	25.7	2	600	296	4.8	3
3	Arbirlot	6	69	4	18	4	8.1	4	166	102	0.9	5
4	Arbroath	13	149	5	59	5	7.3	5	8,232	3,107		5
5	Inverkeilor	2	37	3	8	3	21.3	3	216	116	3.1	3
6	Lunan	1	16	2	4	2	15.9	3	68	30	2.4	3
7	Kinnell	3	30	3	24	4	19.2	3	176	82	3.0	3
8	Kirkden	6	76	5	32	5	10.7	4	301	154	1.9	4
9	Carmyllie	4	28	3	8	3	15.0	4	146	76	2.5	3
10	Moniekie	7	37	3	10	3	22.2	3	246	136	3.0	3
11	Craig	5	68	4	27	4	18.3	3	406	153	3.7	3
12	Maryton	3	12	2	6	3	11.3	4	32	23	0.8	5
13	Dun	6	70	4	34	5	3.9	5	101	81	1.3	4
14	Montrose		216 ^{ts}	5	112	5	2	5	4,126	1,485		
15	Logie Pert	5	35	3	20	4	16.1	3	44	27	0.5	5
16	Stracathro	3	48	4	12	3	15.8	3	112	60	1.1	4
17	Brechin		168 ^{ts}	5	66	5	1.8	5	216	116		
18	Farnell	2	4	2	4	2	76.8	2	95	64	7.7	2
19	Carreston	2	4	2	4	2	36	2	37	20	4.3	3
20	Menmuir	0	0	1	0	1	411	1	118	73	45	1
21	Lethnot	0	0	1	0	1	103	1	32	20	12	1
22	Edzell	4	80	5	40	5	10.3	4	310	160	1.9	4
23	Loch-Lee	0	0	1	0	1	131	1	92	45	47	1
24	Aberlemno	6	20	3	4	2	23.4	3	144	78	3.3	3
25	Guthrie	5	20	3	10	3	9.9	4	57	35	1.1	4
26	Rescobie	5	17	2	9	3	21.9	3	115	76	3.0	3
27	Dunnichen	8	68	4	24	4	16.7	3	413	215	2.9	3
28	Inverarity	8	106	5	40	5	4.7	5	164	89	0.7	5
29	Forfar		158	5	56	5		5	4,349	1,831		5
30	Kinnettles	3	40	3	6	3	5.0	5	67	32	0.9	5
31	Glamis	10	68	4	28	4	9.7	4	252	113	2.0	4
32	Newtyle	1	4	2	0	1	211	1	290	144	36.3	1
33	Eassie	2	8	2	0	1	42	2	115	58	7.2	2
34	Ruthven	1	4	2	3	2	31.8	2	39	23	4.0	3
35	Airlie	1	4	2	3	2	119	2	134	75	14.7	2
36	Kingoldrum	1	2	1	2	2	106	2	69	40	14.5	2
37	Kirriemuir	12	129 ^{ts}	5	61	5	0.9	5	1921	889		5
38	Oathlaw	3*	1/7 0	1	0	1	2.98	1	96	49	47	1
39	Tannadice	3*	1/7 0	1	0	1	597	1	166	111	55	1
40	Fern	1	2	1	2	2	235	1	94	68	12.6	2
41	Glova	13	39	3	39	5	8.1	4	99	62	0.95	5
42	Lintrathen	0	0	1	0	1	316	1	82	55	27	1
43	Glenisla	0	0	1	0	1	331	1	108	69	39	1

Table 2.5.a. Roads-Transport and Communication for rural centre hierarchy

			Roads by class			Rail- way	Post- office	Bus Service
	Parish	Centre	5 A	3 B	1 C	5 R	5 P	10 BS
1	Barry	Carnoustie	2	3	0	1	3	16
2		Barry	2	4	1	1	1	16
3	Panbride	Muirdrum	4	0	1	0	1	16
4		Easthaven	0	2	0	1	0	7
5		Panbride	0	4	0	0	0	8
6	Arbirlot	Arbirlot	0	3	0	0	1	7
7	Arbroath	Arbroath	3	5	0	1	3	town served
8		Anchmite	0	1	2	0	1	1/7
9		Marywell	2	0	1	0	0	12
10		Woodville	2	0	0	0	0	9
11		Colliston	2	1	1	0	0	9
12		West Newton	2	2	0	0	0	12
13	Inverkeilor	Inverkeilor	2	3	1	1	0	7
14	Lunan	Lunan	0	3	0	0	0	7
15	Kinnell	Kinnell	0	2	1	0	0	13
16	Kirkden	Friockheim	3	2	0	0	1	39
17	Carmyllie	Redford	2	1	0	0	0	7
18		Carmyllie	0	4	0	0	0	7
19	Monikie	New Bigging	0	2	2	0	1(1)	4
20		Monikie	0	3	1	0	1	9
21		Craigton	0	4	0	0	1	4
22	Craig	Femeylen	0	2	0	0	1	18
23	Maryton	Barhead	0	4	0	0	0	4
24		Maryton	2	2	0	0	0	4
25	Dun	Mains of Dun	2	2	0	0	0	20
26	Logie Pert	Craig	1	1	1	1	1	7
27		North Craig	2	1	2	0	0	7
28	Stracathro							
29		Hospital	2	0	1	0	0	24
30	Brechin	Brechin	5	4	0	2	3	town status
31		Trinity	2	1	0	1	1	17
32	Farnell	Farnell	0	3	1	1	1	4

			A	B	C	R	P	BS
33	Careston	Careston	-	4	1	0	0	2
34	Menmuir	Tigerton	0	3	0	0	0	4
35		Kirkton of	0	3	0	0	0	0
36	Lethnot of Navar	Bridgend	0	4	0	0	0	2
37	Edzell	Edzell	0	4	2	0	1	21
38	Loch Lee	Tarfside	0	2	0	0	1	0
39	Aberlemno	Aberlemno	0	4	0	0	1	7
40	Guthrie	Guthrie	0	4	1	0	1	4
41	Rescobie *							
42	Dunnichen	Letham	0	7	0	0	1	12
43		Dunnichen	0	5	0	0	0	12
44		Craichie	2	1	0	0	0	5
45		Bowriefauld	0	3	0	0	0	5
46	Inverarity	Gateside	2	2	0	0	0	16
47		Inverarity	0	4	0	0	0	16
48	Kinnettles	Douglastown	2	1	0	0	0	4 town
49	Forfar	Forfar	6	3	0	1	2	status
50		Kingsmuir	2	2	1	0	1	12
51		Lunanhead	0	2	1	0	1	11
52	Glamis	Glamis	4	1	0	0	1	12
53		Charleston	2	1	1	0	0	12
54	Newtyle	Newtyle	2	2	0	0	0	5
55	Eassie Nevay	Eassie	2	2	0	0	1	4
56	Ruthven	Ruthven	2	1	1	0	0	4
57	Airlie	Craigton	2	1	0	0	1	4
58	Kingoldrum	Kirkton of	0	5	1	0	1	1 town
59	Kirriemuir	Kirriemuir	3	5	0	0	4	status
60		Padanaram	2	0	1	0	0	16
61		Maryton	2	1	1	0	0	16
62		Northmuir	0	5	0	0	1	24
63		Westmuir	2	0	2	0	1	18
64	Oathlaw	Finaron	2	1	1	0	0	2
65		Pantsford						
66		Oathlaw	2	3	1	0	0	-
67	Tannadice	Tannadice	0	4	0	0	1	1
68	Fern	Fern	0	3	0	0	0	1
69	Clova	Dykehead	0	3	1	0	1	2
70		Clova	0	3	0	0	1	2
71								
72	Glenisla	Kirkton of	0	2	1	0	0	0
73		Folda	0	2	0	0	0	0
74								
75								

Table 2.5.a.

J-17-

4. The fourth and final variable is that of Railway Service. All these factors when combined with other sectoral contributions will help to rank these centres. These data are recorded for 6 urban settlements and 66 rural settlements. Table J.2.5.a. shows the compiled data.

J.3.

Sectoral Survey Results and Recommendations

J.3.1.

The Survey Results

The survey, as afore stated was directed towards the assessment of the accessibility of the Angus District and the identification of areas with special problems or potentials for development, also in relation to other sectoral survey results. The following results were obtained.

1. The survey of physical provision of roads reveals that all the Northern parishes are less provided with roads. This can be related directly to the relief, the area being highland with less productive agricultural lands. The parishes of Glenisla-Lintrathen-Clova-Loch Lee- Lethnot and the Northern part of Edzell have less than 4 km of road per unit area. Angus South is fairly well provided with adequate roads except for the Barry-Panbride parishes and the highlands in the Glamis-Newtyle area. The rest of the parishes have 12 or more km per unit area. Maryton, even though between Montrose and Brechin is less accessible. (See figure J.2.4.a.).

2. Roads are provided for human use. When the present situation of road provision is compared with the population using it, another picture emerges. Parishes with problems of less roads to population appear to be located near the major township centres, such as Dunnichen and Kirkden near to Forfar, also Edzell and Stracathro, Careston, Farnell, all surrounding the township parish of Brechin. No problem seems to exist in the highland zones (See fig. J.4.2.). Again the lowland area is envisaged as the main development area.

3. The results of the socio-economic accessibility of the parishes as regards public bus services, reveals that the bus services to the highland parishes are again below standard. Since all the Northern parishes do not have access to public bus services, this indicates contradiction to the goal and policies as accessibility of the remote area. The high accessibility recorded in the parishes of Clova/Cortachy is due to the provision of post bus services to the glens of Clova which make them highly accessible to Kirrimuir.

This area is also of tourist interest. The western parishes near to the District of Perth are not highly accessible to Dundee and the main towns in Angus. These are the parishes of Newtyle-Eassie-Airke and Kingoldrum.

The parishes of Farnell and Careston appear to lack physical provision of adequate roads leading to low public transport, even though they are near Brechin.

This is clearly portrayed in Fig. J.2.4.d. The Total transport dependency ratio to bus service provision also justifies the present spatial distribution of bus services. The overall results obtained, when all these results are related to other factors of development such as agriculture, demography etc. are expressed in general report chapter 4.

A combined analysis of all road transport and communication suggests that at present Angus District is fairly well accessible in terms of roads, bus services and communication and the spatial distribution is quite adequate with more than 80% of the parishes above average and out of the problem zone. The 8 parishes which are below 40% in terms of scoring are mostly in the upland area in North Angus. (See the composite data on table J.3.1.a)

J.3.2.

Recommendation

The following recommendations are based on the sectoral survey findings.

1. If economic growth is to be encouraged, more priority should be given to roads with problems in the present developed areas, since they have potentials to attract more development such as the parishes of Barry, Panbride, Arbroath etc. since commercial activities have a generally high demand for road transport.
2. It is recommended that continued use of post bus services to the remote areas be encouraged and expanded to the remote parishes such as Loch Lee (Tarfside) Edzell and Brechin and to the connection of Glenisla to Kirrimuir.
3. Due to the oil-related activities, vehicular access to Montrose harbour should be speeded up.
4. It is recommended that the results of Scotmap be applied but reconsidered in terms of the remote areas without services at present.
5. It is recommended that attention be given to day-to-day assessment and execution of maintenance functions.
6. More effort in coordination of and maintenance of existing services are recommended.

The priority area . This paragraph is divided into two parts:

- (a) the problem area and (b) the potential area.
- (a) The problem area includes the 8 parishes below the limit of acceptable accessibility namely the parishes of Glenisla-Lintrathen-Fern-Tannadice, Loch Lee, Lethnot and Menmuir. A survey for provision of either post bus service might alleviate the problem of accessibility in this area.

(b) The potential areas for development constitute the pari
70% or higher accessibility index as can be seen on the syn
fig. J.3.3.a. or fig. 7.

These two settings may change when other factors of develop
Further and final priority setting can be found in chapter
report.

COMPOSITE INDEX OF ACCESSIBILITY

		Road density	Road quality density	Population road ratio	Daily bus frequency	Peak hour frequency	Population daily service	Bus dependency/daily service	Sum of all road transport	Composite ranking
A	B	C	D	E	F	G	H	J	K	L
1	Barry	12	8	12	20	8	8	10	76	4
2	Fanbride	12	8	4	8	8	8	6	54	2
3	Arbirlot	18	8	8	16	8	8	10	74	4
4	Arbroath	20	10	12	20	10	10	10	92	5
5	Inverkeilor	20	4	12	12	6	6	6	70	4
6	Lunan	20	10	16	12	4	4	8	74	4
7	Kinnell	16	8	8	12	6	8	6	64	3
8	Kirkden	20	8	4	16	10	10	8	76	4
9	Carryllie	18	8	16	16	6	6	8	76	4
10	Monikie	20	8	8	12	6	6	6	66	3
11	Craig	16	10	4	12	8	8	6	64	3
12	Maryton	8	8	16	16	4	6	10	68	3
13	Dun	12	6	12	20	8	10	8	68	3
14	Montrose	20	10	12	20	10	10	10	92	5
15	Logie Pert	20	3	8	12	6	8	10	72	4
16	Stracathro	16	6	4	12	8	6	8	60	3
17	Brechin	16	8	20	20	10	10	10	94	5
18	Farnell	12	4	8	8	4	4	8	48	2
19	Careston	12	6	8	8	4	4	6	48	2
20	Menmuir	12	4	12	4	2	2	2	38	1
21	Lethnot	4	2	20	4	2	2	2	36	1
22	Edzell	4	2	4	16	10	10	8	54	2
23	Loch-Ler	4	2	20	4	2	2	2	36	1
24	Aberlemno	12	4	12	12	6	4	6	56	2
25	Guthrie	20	10	16	16	6	6	8	82	5
26	Rescobie	20	8	16	12	4	6	6	72	4
27	Dunnichen	20	10	4	12	8	8	8	70	4
28	Inverarity	16	4	6	20	10	10	10	78	5
29	Forfar	20	10	20	20	10	10	10	100	5
30	Kinnettles	20	10	20	20	6	6	10	92	5
31	Glanis	12	10	12	16	8	8	6	72	4
32	Newtyle	12	6	4	4	4	2	4	36	1
33	Bassie	12	6	8	8	4	2	4	44	2
34	Ruthven	16	8	16	8	4	4	6	62	3
35	Airlie	16	8	16	8	4	4	4	60	3
36	Kingoldrum	8	4	20	8	2	4	4	50	2
37	Kirriemuir	16	8	20	20	10	10	10	94	5
38	Oathlaw	16	8	16	4	2	2	2	50	2
39	Tannadice	8	4	12	4	2	2	2	34	1
40	Fern	8	2	8	4	2	4	4	32	1
41	Clova	4	2	20	16	6	10	10	68	3
42	Linthrathen	4	2	16	4	2	2	2	32	1
43	Glenisla	4	2	20	4	12	2	2	36	1

Note

(1) No. of parishes below 44% of combined accessibility factors = 8.

This represents only 18% of the District as problem area.

(2) An average of 63% accessibility is recorded for the District
(i.e. \bar{x} = 63%
S.O. = 18%

(3) Method of ranking.

Range no. rank

78% - 8 = 5

70%-77% = 10 = 4

60%-69% = 9 = 3

44%-50% = 8 = 2

32%-43% = 8 = 1

(b) The potential areas for development constitute the parishes with a 70% or higher accessibility index as can be seen on the synthesis map, fig. J.3.3.a. or fig. 7.

These two settings may change when other factors of development are combined. Further and final priority setting can be found in chapter 5 of the main report.

This is clear shows with a ratio to bus thesis map, distribution results are r ment are combined. demography et 5 of the main A combined an. at present An, bus services : with more than zone. The 8 p: in the upland

J.3.2.

The following

1. If economic roads with pro to attract mo etc. since cor transport.

2. It is recor areas be encou (Tarfside) Ed:

3. Due to the should be spee

4. It is recon in terms of th

5. It is recon execution of n

6. More effort recommended.

The priority a

(a) the proble

(a) The proble accessibility

Lee, Lethnot a might alleviat

	Bus dependen- cy/daily service	Sum of all road transport	Composite ranking
	J	K	L
	10	76	4
	6	54	2
	10	74	4
	10	92	5
	6	70	4
	8	74	4
	6	64	3
	8	76	4
	8	76	4
	6	66	3
	6	64	3
	10	68	3
	8	68	3
	10	92	5
	10	72	4
	8	60	3
	10	94	5
	8	48	2
	6	48	2
	2	38	1
	2	36	1
	8	54	2
	2	36	1
	6	56	2
	8	82	5
	6	72	4
	8	70	4
	10	78	5
	10	100	5
	10	92	5
	6	72	4
	4	36	1
	4	44	2
	6	62	3
	4	60	3
	4	50	2
	10	94	5
	2	50	2
	2	34	1
	4	32	1
	10	68	3
	2	32	1
	2	36	1

Note

(1) No. of parishes below 44% of combined accessibility factors = 8. This represents only 18% of the District as problem area.

(2) An average of 63% accessibility is recorded for the District (i.e. $\bar{x} = 63\%$ S.D. = 18%

(3) Method of ranking

Range no. rank

78%+ = 8 = 5

70%-77%=10 = 4

60%-69%= 9 = 3

44%-59%= 8 = 2

32%-43%= 8 = 1

SECTORAL REPORT K

DEVELOPMENT ADMINISTRATION,
PLANNING AND FINANCE.

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SECTORAL REPORT K.GOVERNMENT ADMINISTRATION, PLANNING AND FINANCE IMPACTING ON THE
ANGUS DISTRICT.K.1. Present situationK.1.1.0 Development problems and impediments, and the evolution
of the political - administrative system.K.1.1.11 Political Setting

The geo-political organisation of the United Kingdom and its associated terminology may be taken to be:

United Kingdom (U.K.) - United Kingdom of Great Britain and Northern
Ireland or the British State; Britain is a
short version of this term.

Great Britain (G.B.) - England, Wales and Scotland, which means the
U.K. excluding Northern Ireland.

England, Wales and Scotland are component "nations" of all the British
entities above.

The Territorial Governments of the United Kingdom

U.K. (London)
Government
Parliament
(Westminster)
Court

England
(London)
Government
departments
Courts

Wales
(Cardiff)
Welsh
Office
Courts

Northern
Ireland
(Stormont)
Government
Parliament
Courts

Scotland
(Edinburgh)
Scottish
Office
Courts

LOCAL
AUTHORITIES

REGIONAL
COUNCIL

DISTRICT
COUNCIL

(1)

Though Scotland has neither a government, nor a parliament of its own, it has a strong constitutional identity and a large number of political and social institutions. The Act of Union of 1707 which is the "fundamental law" joining Scotland with England, laid down that Scotland would retain for all time certain key institutions such as the Scottish legal system, the Presbyterian Church of Scotland (the Established Church), the Scottish educational system, and the "royal burghs" (local authorities, see Appendix 2). These have been the transmitters of Scottish national identity from one generation to the next.

K. 1.1.2 Parliament

Scottish M.P.'s are an integral part of the House of Commons and Scottish peers can elect representatives to the House of Lords. Since 1950 there have been 71 M.P.'s from the Scottish constituencies in the House of Commons, in 1885 there were 72. This is an overrepresentation in terms of ratio of Scots to population. These M.P.'s are a distinct group in the House, having their own committees to sit on, their own Bills to discuss, and their own ministers to question. Beyond the floor of the House itself, the Scottish committees represent the Scottish political system in its parliamentary aspect.

These committees are now four in number, though two are not in continuous existence(1). The Scottish Grand Committee was established in 1894; it consists of all 71 Scottish M.P.'s with 10 to 15 others added to bring the party balance into line with that in the House as a whole. This committee considers Scottish Bills referred to it at the second reading and reports to the House so that the Bills may be disposed of formally (2 - 3). There are two Scottish Standing Committees.

The first was established in 1957, and the second in 1962. These committees examine Bills in detail and vote on whatever amendments are considered necessary. It is now possible for a Scottish Bill to go through all its stages, apart from formal first and second reading, in the Scottish committees. The fourth committee is the select committee, with power to examine witnesses and documents, and was first appointed in 1969 to examine economic planning in Scotland. This committee also reflects the balance of the parties in the House of Commons.

K. 1.1.3 Central Government

The Secretary of State for Scotland is not the chosen leader of the majority party in Scotland, but the Scottish spokesman of the majority party in Westminster. It sometimes happens that the two majorities do not coincide so that Scotland is ruled by ministers whose party has a minority of the Scottish seats.

There was initially a Secretary of State for Scotland in the Government, but this was dropped in 1746, leaving the Chief Scottish law officer the Lord Advocate, as the principal spokesman for Scotland in the executive. In the nineteenth century, the development of Scottish Administrative Boards and rising national feeling led to the demand for a Scottish Office headed by a Secretary for Scotland.

In 1855, this office was established and the Scottish Secretary gained a permanent place in the Cabinet in the course of time. The "ministerial team" at the Scottish office now consists of the Secretary of State, a Minister of State and three under-Secretaries of State for Development, Home Affairs and Agriculture, Health and Education respectively - and later addition of equal rank, Deputy Under-Secretary of State.

K. 1.1.4 The Role of Government in Development Problems

The Scottish Office has taken over some of the areas occupied by local government and has played a strong directing role in promoting the establishment of bodies, such as the Scottish Development Agency, with the authority to carry out certain functions. Indeed it has been a powerful force behind the whole local government reform movement. When economic planning became important in the early 1950's, it became acutely aware of the shortcomings of the local government structure. The attraction of industry to Scotland required the provision of a suitable "infrastructure" such as housing, roads, water supply and schools. Factories could not be built without these, yet local authorities were not anxious or always able to incur the necessary expense. Nor were they willing to co-ordinate their activities.

The arrival of BMC (now British Leyland) at Bathgate and Rootes (now Chrysler) at Linwood in the early 1960's highlighted these problems, for both developments were hampered by inadequate local response.

One way to circumvent such difficulties was to set up New Towns which could provide the resources for industry without the problems facing local authorities. Another innovative institution is the Scottish Special Housing Association, a government financed body which builds houses at low rents where industry is being developed or where a local authority is proving inadequate.

These measures were not adequate to cope with all the shortcomings of the old system of the 1960's. Scotland's economy was lagging badly compared to most of Britain's and declining industries, high unemployment and emigration led the government to attempt stronger remedial action. The 1963 Central Scotland Plan and various other regional plans, called for the development of growth areas involving close co-operation between central and local government, and a new degree of joint action between the authorities of the growth areas.

But it became evident that ad hoc arrangements would not be sufficient to cope with the situation in Scotland as a whole. Although growth areas did not involve all local authorities, the problems they presented drew attention to the general inadequacies of the system which had been brought about by movements of people, poor local resources and duplication of authorities. After extensive investigations by commissions of inquiry and deliberations by all the parties concerned, a new two-tiered system of local government was implemented in 1975.

K. 1.1.5 The structure and functions of local government (See Appendix 2)

The new structure of local government, resulting from the Wheatley Commission, has defined the Regions and as areas in which identifiable internal coherence and community of interest can be traced, and where resources are available to match the range of functions allocated to their authorities.

The Paterson Report (7) provided guidance on organisation and management structure to the Regional and District Councils. The report was based on a corporate approach to local government policy making and implementation.

It recommended the appointment of a Chief Executive without departmental responsibility, a management team, departments organised on a programme area basis, and for regions such as Tayside (and the other three large ones) a policy planning unit as part of the Executive Office. The report also recognised the need for a political parallel, amongst members of the councils, to the management team of council officers. It therefore recommended the adoption of a Policy and Resources Committee with responsibility for identification of Governmental objectives, coordination of other committees, settling disputes, and monitoring and reviewing of the performance of service committees. Most Scottish local authorities, including Tayside and Angus, have accepted Paterson as a basis for organisation and management.

K.1.2. Policies and plans

K.1.2.1 The existing development planning system

The existing development planning system was implemented simultaneously with the new system of local government and provides four elements corresponding to each level of government impact on a particular area within the Angus District; just as the old system had planning instruments corresponding to the then existing layers of authority. Thus we have the National Planning Guidelines (NPG) emanating from the Scottish Office, the Regional Reports (R.R.) and Structure Plans (SP) being the responsibilities of the Regional Council and Local Plans (LP) being looked after at the District Council level.

K.1.2.2. National planning guidelines

Seeking to achieve a decentralised mode of planning in which longstanding matters are settled on the basis of agreed policies, and are then shifted to the background for independent action; the role of the NPG is to ensure that the national interest is given due weight in regional and local planning. In the case of Angus District, the natural resources or potential for development in Montrose has national significance in terms of the needs of oil and gas exploitation. Therefore the Scottish Office would require that safeguarding policies are included in Regional Reports and in all other plans.

K.1.2.3

The Regional Report

The Tayside Regional Council has now produced a series of three Regional Reports (the latest RR available is dated 1978) covering its entire area and providing an annual review of development planning and policies in relation to the Structure Plan (SP). Based on the Regional Report, the Report of Survey stated that "the main problem was that of unemployment and the difficulties were compounded by the shortage of serviced industrial land in the right places. The amount and distribution of residential land to meet current and future housing was also found to be deficient. The major difficulties affecting the resolution of these problems were considered to be the inadequate water and sewerage infrastructure and the constraints upon public expenditure.

K. 1.2.4.

The Structure Plan

The first Structure Plan is undated but appears to have been published in 1979. Its main function in the planning system is to "concentrate" upon land use problems and needs which require strategic planning action" In consideration of the conflicts and constraints in the interrelationships of all matters in the Regional Report, it was decided that the preparation of a Settlement Policy for the Tayside region was the main issue to be dealt with in the Structure Plan, with the provision that in case of competing requirements between housing and industry the needs of industry are to be given precedence.

K. 1.2.5. Local plans and the housing plan

In accordance with the complementarity between Local Plan, which are primarily the responsibility of the District Council, and the Structure Plan, new-housing targets for each of the planning areas within the Angus District have been laid down in the Structure Plan and it has been left for the Local Plans to allocate the specific sites. The Housing Plan gives an annual assessment of the present situation and projections for the future covering the implementation of all Local Plans throughout the Angus District.

K. 1.2.6 Financial plans

Within the guidelines issued by the Scottish Office, the objective of the Financial Plans is to give a clear indication of both the Regional and District Councils spending programme areas a full year period. The Financial Plans have to be submitted to the Scottish Office annually and schemes included in the programmes should be supported by policy statements and ranked in order of priority. In practice, the Regional Council seem to have adhered to this requirement only in its last Financial Plan (1981/82), and the Angus District did not appear to do so at all.

K.1.2.7 Comparison of plans for new housing

The table below gives a comparison of the percentage shares of new housing per planning area for Structure Plan, Financial Plan (80/85) and the Housing Plan (80/85)

Table K. 1.2.1a. Planned Percentage Shares of New Housing in Angus
1980-85

	Structure plan %	Financial plan %	Housing plan %
ARBROATH	27	35	20
BRECHIN	13	14	9
CARNOUSTIE	10	6	10
FORFAR	24	10	6
KIRRIEMUIR	-	2	1
MONTROSE	16	23	20
LANDWARD	10	10	34
	100	100	100

It would be expected that the Structure Plan figures would be the targets for the other plans to be achieved by the end of the plan period.

It is understandable that there would be divergencies upwards or downward at a particular time. But it is important that large departures from targets are not built upon each other resulting in the need for drastic corrective action in the future.

The figures for the Financial and Housing Plans are for expenditures not legally committed and they are taken for planning areas, and not in terms of specific projects, so there is a possibility for error. But on the other hand, divergencies would also be an indication of weaknesses in the administrative and planning system. It would be desirable that projects and expenditures which cover the same period in the same areas be common to the two documents.

Chapter K. II Towards Priority Areas.

K.2.1. Sectoral Methodological Approach

K.2.1.1 General idea and variables

Taking economic growth as an overall development objective, the analysis of the administrative and financial sector geared toward priority areas, is an attempt to consider the resource allocation in Angus District. It is believed that public expenditure is an important factor in increasing the opportunities for economic growth in this area since the existing economic determinants such as water supply and sewerage are becoming sluggish. Priority area in this sector means that the areas belonging to a certain public expenditure classification will be grouped together. The groups classified in the middle range may be set as a first priority according to the rural center planning idea of the team.

The variable used in considering the allocation of government resources is the expenditure of government in the particular area. Of this expenditure, two-thirds comes from the central government in various form and the local government takes responsibilities for one-third. One problem arose in considering this government expenditure. The structure of local government which has many administrative units in various levels may cause overlapping in public spending in some sectors. But according to the fact that the regional council and the district council have some entirely separated responsibilities. The former taking responsibilities in water supply and sewerage, transportation, education and health. And the latter having duties in housing, community services and tourism. This separation is clearly stated in both the local and regional development plans. The difficulties were not very great. The team thus used static; physical data such as population, road miles, number of pupils to apportioned revenue amount from the Tayside totals to the Angus District.

K.2.1.2 The discrimination of parishes

The preliminary idea of determining the distribution of public money spending will be fit to the overall methodological approach in other development sectors. The first determinant is the area.

Area needed to be considered is the parish level within the boundary of Angus District of which the total number is 43. Since the parishes are the smallest administrative unit for which the details are available. The different and homogenous condition in these parishes classified by several variables in various development sectors will contribute to the suitable priority area. This was clearly stated in detail in Chapter III of the main report.

According to the table in Appendix K.1, public expenditure allocated to each parish will be broken down in terms of development scheme, sector by sector. There are 10 sectors to be determined namely : housing, water supply and sewerage transportation and communication, health, education, social work services, communities facilities, general services, industry and general administration. Agriculture was excluded because the agricultural subsidies are coming directly from national budgeting in London. Therefore the data are unfortunately not available within the period of field work operation in the area.

K. 2.1.3 Source of data and assumption used in calculation

In each specific development sector, public expenditure is broken down into two main categories, the capital cost and revenue cost. Capital expenditure is spent on creating permanent assets. Revenue expenditure is used to provide the day-to-day running of services: The wages of employees, the maintenance cost: transport and administrative cost and the borrowing charges. In the first stage, the period of time between 1975-1980 was selected to be determined in order to find out the average of public expenditure per capita of each development sector in each parish, since this is the best way to examine the trend of government expenditure. However, due to time limitation in fieldwork operation, the time period eventually decided on was one year of expenditure in 1979-1980.

2.2. Collection of data, existing and non-existing

2.2.1 Preparation stage

3 Main data categories were set at ITC as a target for investigation in detail in Scotland. The first one is the existing administrative organisation functionary in the study area. The second is the budgetary procedure and the last is the detail of government expenditure in the study area. The meetings held in ITC highlighted the availability and assessment of this source of data. It was found that information for the last category was scattered in various documents, related to planning and administration problems in Scotland as a whole. Budgetary procedure and the detail of government expenditure were available only in the area. According to the survey planning, the first draft of preparatory sheets were distributed to every sector and the information of government expenditure was supposed to be sent by various development sectors in certain setting deadline.

2.2.2 Fieldwork stage

Most of the data needed were obtained from various documents, especially from the financial report the team received from various levels of government officers.

Apart from this, development policies and problems were determined by discussion with the government official in the finance department. Beside the financial report and other useful documents, we found that some information still was not obtained because of a weak co-ordination between the Regional council and the district council based on a lack of clear-cut responsibilities in the planning process. However, most of the information was available except in case of the agricultural sector, since its spending comes directly from the central government through the Scottish office and both regional and district council did not deal with these data.

K. 2.3 Data analysis for homogeneity and hierarchization

K 2.3.1 Advantages and disadvantages of variables

In the preliminary result of the public expenditure in each parish, two main categories were determined, the first is the total capital cost per capita, and the second is the total capital and recurrent cost per capita. The former indicates the concentration of local government expenditure which tends to create the opportunity for economic growth in particular areas. But in terms of timing, this capital cost has been considered only in one fiscal year (1979-1980) as mentioned earlier. This results in uncertainty of analysis in the trend of economic growth in the long term, since nobody knows whether the past level of restraint on public expenditure continues in which particular area.

For these weaknesses, the latter, which comprises both capital and revenue should be in the better position for analytical work, in terms of both homogeneity and hierarchization, since the revenue cost shows the continuation of government expenditure according to the population targets in each parish.

K. 2.3.2 Homogeneity in terms of public expenditure

The preliminary classification of homogenous areas was done through the coloured map. First, 32 parishes are classified by capital and recurrent cost per capita per parish, into 5 ranks. Each rank is based on the basic assumption according to the rank classification discussed earlier with every sectoral group. Therefore the 5 ranks in the financial group are as follows:

Table 2.3.1

Rank	Rate of capital and revenue per capita
I	1045 - 5682
II	692 - 983
III	596 - 663
IV	479 - 561
V	321 - 478

In terms of capital cost, the financial report of Angus district council in the year 1978, 1979 and 1980 are used as a data source and in the case of Tayside Regional council, the 1980 and 1981 financial reports are used. This is because the specific figures, the government expenditure of 1979-1980 fiscal year are continuously stated year after year. Apart from this, the financial report of other agencies such as the Board of Health, the SSHA and the SDA were used as well. In terms of revenue cost, the financial report of Angus district in the year 1981-1982 was the main information source. It is clear that in both categories, two criteria should be kept in mind in order to get the real expenditure figure. The first is to determine only the legally committed figure in case of capital cost and the second is to use only the actual net expenditure in case of revenue cost, so that one can see the picture of public spending in this area as clearly and as completely as possible.

The breaking down of the capital cost can easily be seen from the financial report itself. Since almost all of the development projects are clearly stated in terms of town or specific site that can be identified into parishes by the Scottish Gazetteer, except in the housing capital cost where some parts are not identified as to the place of spending, the distribution of this amount to each parish, therefore, will be based on housing stock proportion in each parish. Certain assumptions as in this case, are used as a criterion of the money distribution in the revenue cost, because this expenditure is stated as the overall figures in the financial report for the area as a whole. However, since the most important idea behind the government expenditure is the provision of services for a population in order to achieve the better quality of life, the percentage of population in each parish then should be the main criterion in the revenue distribution. Apart from this, certain other assumptions are used in the specific sector such as the number of pupils for the education sector, such as the length of the road for the Road sector etc. (The details of the calculation can be seen in the Appendix Table K.1.1.).

It is clear from the table and the coloured map (Appendix K. 3) that the large development projects in specific areas are the main factors in creating the high proportion of government expenditure per capita. Some parishes, such as Linthrathen, Rescobie, Inverarity fall in this category. But at the same time, the high population density in specific towns is the main factor in reducing the proportion of government expenditure in some parishes, despite the fact that there are many large development projects in those areas. The parishes of Arbroath, Montrose and Forfar for instance fall in this category. One concrete result arising from the table is that, in terms of the financial allocation, except a few cases of specific development projects in some parishes, government expenditure is rather low in the area of low population density. However, this is a question of overall consideration among various development sectors later on according to homogeneity and hierarchization approaches.

K.2.4 Contributing variable to homogeneity and hierarchization

As mentioned earlier, for this administrative and financial sector, the government expenditure is the only variable used in determining the homogeneous zone and the hierarchy of centres. The variable which is going to contribute to that analysis is the government expenditure in the form of capital and recurrent cost per capita which has been discussed in detail in the previous paragraph.

In homogeneity scoring, the weight given to the financial sector is 10, as high as the physical infrastructure factor. This is because the finance from the government is the only factor that can push the other economic carriers. The creation of economic growth through employment opportunity will be seriously impaired if a higher allocation for development is not forthcoming. Other economic carriers by itself; according to the existing situation, can no longer create the condition for economic growth unless there is a help from outside: such a help can come through government expenditure in the form of incentives and subsidies.

Chapter III Sectoral Recommendations

3. Priority Areas

3.1

The problems of Angus district as far as expenditure for 1979-1980 is concerned are that the indirect sectors still share a large part in government expenditure. Industry, which, in a mixed economy is a leading sector in achieving both welfare of the people in terms of more employment and economic growth, took only 4.34% of the total capital expenditure in Angus as a whole. The results of this are that the Angus Authority had to give priority to the most potential areas which are the older industrial sites in the larger towns, especially in Forfar, Montrose and Abroath. But as far as Angus district is concerned, there were only slight changes in the promotion of industry from the year 1976 - 1980.

However, considering the Government's emphasis on industrial investment, priority areas in terms of urban center should be given to the major parishes mentioned above. The first priority should be Forfar, which has a large share of public expenditure in infrastructure and social work services. On this same basis Arbroath and Montrose could qualify as second and third priority respectively. But this priority relies merely on the expenditure figure. If we take the whole idea of development into consideration, there are many factors which need to be kept in mind. One proposal is that high priority areas in terms of urban centre cannot be considered separately from its linkage effects to the rural area, which might be selected as a rural key centre at the same time. The rural area with a high potential of being a key centre, in terms of public expenditure should be Monikie which was given a high investment in water supply and education, and Edzell with a high investment in housing. If we take investment in roads as a key determinant in industrial incentive, the area with high potential in this case should be Aberlemno, Inverarity and Rescobie respectively.

3.2 Policies and planning

3.2.1

The Structure Plan should give explicit priority ranking to projects within the Angus District and clear time phasing of developments in water and sewerage, in industrial facilities and in housing. This is not intended to destroy the flexibility of the present structure plans, but only to increase attention to the critical bottlenecks of development. This objective may also be achieved by a detailed annual Economic review document to accompany the Economic master Plan, recommended below.

3.2.2

Local plans should have details of location, costs and other physical data on projects carried out in their areas. For the Angus District, the sector of greatest concern would be water and sewerage, industrial infrastructure and housing.

3.2.2

The annual financial plans of Angus District Council should show a clear link to the proposals and recommendations of the Structure Plan, and be a means of indicating the rates of progress in achieving the objectives and policies of the Structure Plan.

3.2.4

It would appear that the lines of reporting and accountability of the Tayside Regional Council runs upwards to the Scottish office, but there is a need for the District Council to be able to assess the activities of the Regional council in its area. For this, it may be necessary that the regional council be requested to produce an annual report at least covering the sectors that are of critical importance to the development of the district.

3.2.5

A clear need exists for an economic policy document which would integrate, give coherence to and synchronise the objectives, proposals, policies and plans of the various Scottish office guidelines, the regional report (RR), the Structure Plan (SP), the financial plan and the Local Plans (LP).

3.3 Government Structure

The division of responsibilities between the Tayside Regional Council and the Angus District Council leaves all the capital investments in relevant infrastructure such as water and sewerage outside the capacity of the Angus District Council.

It is apparent from the Structure Plan that the Regional Council is increasing the availability of water and the capacity of the sewerage system in Angus District. But it was not possible to relate the amounts expended in Angus to the seriousness of the problem, or to get any indication of whether there has been a decline in the severity of the problem as a result of the attention of the regional council.

This was due to the fact that data collected were for one year only. There seem to be no existing criteria by which funds are allocated for development among competing areas. And it is apparent that for increased allocation of funds to the needs of Angus, there should be increased effectiveness of representation by the 10 regional councillors from the district. For the future, it would be wise for the District Council to match the pace of its provision of industrial and housing infrastructure with the rate of water and sewerage provision by the Regional Council. This is necessary because, regardless of the zeal and initiative demonstrated at the district level for solving the problems of inadequate housing, unemployment and industrial stagnation, it is the rate of removal of the water and sewerage constraints which ultimately decides what is achieved.

In general, only after a number of years will it be possible to determine to what extent the political and administrative system, which takes matters, critical to the development of large areas such as Angus, out of the District's control, realizes the frustration and bitterness of the intended beneficiaries. The people of the District may in time

realize that they know their needs best and feel more acutely their problems. Only then can they respond effectively in terms of timing and energy.

SECTORAL DISTRIBUTION PER PARISH OF LOCAL GOVERNMENT EXPENDITURE FOR ANGUS DISTRICT (Capital and Recurrent cost in thousand of pound sterling).K.I.1

K.I.1

Sectors	Housing		Water Supply		Transport		Health		Education		Social Work Services		Communities Facilities		General services		Industry		Institution recurrent		capital recurrent		Per capita in		
	cap. cost	rec. cost	cap. cost	rec. cost	cap. cost	rec. cost	cap. cost	rec. cost	cap. cost	rec. cost	cap. cost	rec. cost	cap. cost	rec. cost	cap. cost	rec. cost	cap. cost	rec. cost	cap. cost	rec. cost	cap. cost	rec. cost	cost	rec. cost	
Parishes																									
Brechin	229	1047	7	218	218		980	2	1958	2	633	2	36	199	2	52			17		278	4705	39	654	692
Careston	0.4	5		24	24		13	0.03	20	0.04	16			4	0.05	1			4		0.5	87.4	4	624	628
Dun			0.7	53	53		19	0.02	16	0.06	23			6	0.08	2			6		0.2	125.7	0.7	466	466
Edzell	8	68	16	63	63		56	0.1	73	0.2	70		15	38	0.2	6			19		23.5	409	29	509	538
Lethnot			0.2	56	56		11	0.01	10	0.02	8			24	0.03	0.6			2		0.1	111.8	1	1118	1119
Loch Lee	0.2	2	0.2	41	41		11	0.01	10	0.02	8			2	0.03	0.6			2		0.3	76.8	2	600	602
Logiepert	25	15	5	95	95		38	0.01	31	0.1	47			11	0.2	4			13		25.3	259	46	471	517
Menmuir	1.8	9	1	95	95		25	0.01	10	0.08	31			7	0.1	3			9		2	190	5	475	480
Stracathro	0.3	4	2	74	74		3950	0.02	13	0.2	63			14	0.2	5			17		172.7	4142	235	5627	5682
Abiriot	0.9	11	3	87	87		44	0.01	22	0.1	55			12	0.2	5			150		1.2	389	2	662	663
Arbroath	1034	3160	832	214	7		321	189	4407	7	2133		35	788	7	176	130	13	584		2247	15044	92	618	709
Barry	223	796	228	22	85		583	3	1774	5	727		16	354	2	60			199		477	4600	57	554	612
Carmylie	0.4	5	1	110	110		31	0.02	64	0.1	39			9	0.1	3			11		0.7	273	2	612	614
Monikie	1	15	168	8	140		63	759.2	113	0.2	78			30	0.3	6			21		928.7	474	1070	546	1616
Panbride	1	12	353	6	71		119	0.01	47	0.4	148			34	0.5	12			41		385	490	222	282	504
Aberlemno	0.6	8	2	250	90		31	0.02	44	0.1	39			9	0.1	3			11		250.8	237	537	507	1045
Dunnichen	5	63	1	20	72		81	0.2	142	0.3	102			23	0.3	8			28		6.8	539	6	475	481
Essie-Neway	0.6	8	1	51	51		25	0.01	28	0.08	31			7	0.1	3			9		0.8	163	2	485	488
Forfar	353	1928	102	415	305		1931	3	2356	104	1172		34	575	4	97	98	9	321		1003	9027	75	672	748
Glamis	4	28	9	16	114		179	0.01	57	0.1	55			12	0.2	5			15		20.4	474	31	718	749
Guthrie	4.1	2	0.4	49	49		13	0.04	53	0.1	16			4	0.05	1			4		4.2	89.4	21	456	478
Inverarity	0.4	5	1	500	136		48	0.01	53	0.1	47			11	0.2	4			13		500.8	318	1000	635	1634
Kinnettles	0.4	5	0.5		48		13	0.01	135	0.2	78			4	0.05	1			4		0.8	91.5	4	451	455
Kirkden	6	75	22		87		63	0.01	135	0.2	78			18	0.3	6			21		6.7	505	8	589	596
Oathlaw	47.8	10	2		69		19			0.06	23			5	0.08	2			6		47.9	136	162	459	621
Rescobie			1	1000	97		25			0.08	31			7	0.1	3			9		1000.2	173	2674	463	3137
Airlie	1	2			109		31	0.03	22	0.1	39			9	0.1	3			11		1.2	227	3	477	479
Cortachy			1		121		25	0.03	35	0.08	31			7	0.1	3			9		0.2	232	0.6	732	732
Fern	0.9	11	1	45	45		31			0.1	39			9	0.1	3			11		1.1	150	2	318	321
Glenisla	0.9	11	1	131	131		25	0.03	18	0.08	31		8	7	0.1	3			9		9.1	236	27	711	738
Kingoldrum	0.3	4	0.5		66		13	0.01	10	0.04	16			4	0.05	1			4		0.4	118.5	2	559	561
Kirriemuir	78	623	138	68	236		426		1168	1	531		35	163	2	44			146		256	3423	42	563	605
Lintrathen			363		91		25	0.03	35	0.08	31			7	0.1	3			9		363.2	202	1146	637	1783
Ruthven					29		13	0.01	72	0.1	55			4	0.05	1			4		0.1	77.5	7	615	616
Tamadica	0.5	7	0.5		113		44	0.01	72	0.1	55			12	0.2	5			15		0.9	325	2	543	545
Craig	46	78	3	70	70		88			0.3	109			25	0.4	9			30		46.7	412	38	331	368
Farnell			0.8		48		19	0.01	25	0.06	23			5	0.08	2			6		0.2	128.8	0.6	426	427
Inverkeilor	95	13	5	109	109		50	0.01	100	0.2	63			14	0.2	5			17		95.5	436	133	606	739
Kinnel	0.4	5	2	104	104		38			0.1	55			12	0.2	5			15		0.7	236	1	388	389
Lunan	0.5	7	0.7	54	54		19			0.06	23			5	0.08	2			6		0.6	116.7	2	435	438
Maryton	0.2	2	0.5	32	32		13			0.04	16		60	4	0.05	1			4		60.3	72.5	447	537	893
Montrose	383	1403	572	30	128		77	2461	2209	22	977		14	426	3	81	184	18	268		1258	8001	113	717	829
Newtyle	5	65	17	53	53		56	0.01	149	0.2	70			18	0.2	6			19		5.6	453	7	537	543
TOTAL ANGUS DISTRICT	2557.6	9512	2794	1124.4	2078	4151	438	14996	7759.9	14636	145.2	7814	253	2938	2548	646.2	412	40	2119		9484.4	57976.6	106	648	755

Remarks

1. Capital cost of housing, with its specific area of project was not mentioned, was distributed according to the percentage of public housing stock (1980)
2. Recurrent cost of sewerage distributed according to percentage of actual flow of water supply in certain areas.
3. Capital cost of education was distributed according to the percentage of pupils (1980) per parish.
4. Capital cost of social work services, communities facilities and general services was distributed according to the percentage of population per parish.
5. Recurrent cost from the region was first distributed to Angus district according to the percentage of population per district (1980).
6. All recurrent cost if not mentioned specific area of money spending was distributed according to the percentage of population per parish, except the recurrent cost of industrial sector has been distributed according to the percentage of the investment in the area of industrial projects.
7. Social work services consist of
 - publicity, entertainment, tourism, recreation
 - cleansing
 - children's panel
 - police, fire
 - consumer protection
 - valuation of land
8. Community facilities consist of
 - Park, public hall, community centre, bath, library
 - Art gallery, Museum, burial ground
9. General services consist of environmental services, costal protection and miscellaneous items.
10. Institution means manpower recurrent cost, building construction and maintenance cost and general planning and administration cost.
11. Government expenditure on agricultural sector was omitted due to lack of data.

K.2 Local Government Structure

How Local Government works in Scotland

In 1971 the Government first officially mooted its proposals to re-organise local government by presenting a White Paper based on the recommendations of the Wheatley Commission. This formed the basis of the Local Government (Scotland) Act 1973. The Act came into force five years ago on May 16th 1975.

History

Previously, Local Government was a multiplicity of units of varying sizes and functions dating back as far as the Medieval Burghs established by King David I as 12th Century trading communities. By the 14th Century, the Crown began to devolve the collection of revenue to 50 or so Royal Burghs in Scotland. As domestic and foreign trade grew, so did the number of Royal Burghs.

Many of these Burghs declined in the 18th Century as trading monopolies decayed. However, comprehensive reform followed the 1832 Parliamentary Reform Act, based on the existing Burghal structure. With the extension of Parliamentary franchise came the call for further representation, and so town councils became subject to popular election.

In the Counties, new County Councils had evolved from the medieval Sherifffdoms. They succeeded the committees of landowners in each county which, since the 17th Century had fixed assessments, levied taxes and assumed responsibility of the militia, police and road administration.

For centuries, schools and poor relief were administered by parochial landowners. In 1845 Parochial Boards were set up to administer the Poor Law, and from 1872 the Parish became the principal education authority.

In 1918 first steps were taken to simplify the complex structure that had evolved. Over 1000 School Boards were replaced by Education Authorities, elected every three years, for each county and some burghs.

The Local Government (Scotland) Act 1929 went further, abolishing parishes; introducing large and small Burghs; establishing District Councils and reforming the rates system. This remained virtually unaltered for 45 years. But while the structure remained the same, the components altered as society became more sophisticated with technological change and the emergence of the welfare state.

The need to streamline local government can be amply demonstrated by a table indicating the structure of local government in Scotland in 1971.

CITIES	LARGE BURGHS	SMALL BURGHS	COUNTIES	DISTRICTS
4	21	176	33	196

Since 1975, Local Government has been two-tier with the following structure:

REGIONAL COUNCIL AND ISLAND AUTHORITIES	DISTRICT COUNCILS	COMMUNITY COUNCILS
9	53	optional provision
<u>3</u>		with no statutory
<u>12</u>		function

The aim was for regional councils to accept responsibility for strategic and major services, while district councils concerns were to be with more local services. Geographic boundaries were drawn to enable provision of services in areas with natural groupings of population. Some functions, notably planning and recreation and tourism, are run concurrently.

How this operates in Tayside

Prior to re-organisation, there were 34 local authorities and joint boards in what is now Tayside. These were replaced in 1975 by a Regional Council and three District Councils, as follows:-

TAYSIDE REGIONAL COUNCIL	DISTRICT COUNCILS	COMMUNITY COUNCILS
46 members	City of Dundee	98
22 Dundee	= 44 members	Provision for 104
14 Pert and Kinross	Angus	
10 Angus	= 22 members	
	Perth & Kinross	
	= 29 members	

A joint board, with members drawn from Tayside and Five Regional Councils, is responsible for the management of Tay Road Bridge.

The Tay River Purification Board has members appointed by both Regional and District Councils as well as the Scottish Secretary of State.

What does each council do?

The 1975 Act divided the responsibilities as follows: (Those items marked with an asterisk are joint functions).

REGIONAL COUNCILS :

- CONSUMER PROTECTION (weights and measures, food standards and labelling)
- EDUCATION (youth employment and community centres)
- ELECTORAL REGISTRATION
- EMERGENCIES PLANNING (civil defence, peacetime emergencie)
- FIRE
- POLICE (road safety and diseases of animals act)
- PLANNING (derelict land* industrial development*)
- PUBLIC ANALYST
- RATE COLLECTION
- RECREATION AND TOURISM* (countryside*, parks*, museums*, art galleries*)
- REGISTRATION of births, marriages and deaths)

Loans

Authorities may borrow money to finance capital expenditure by means of mortgages, stock or bond issues or from the Public Works Loans Board, as well as by temporary, short-term borrowing within certain limits.

The commission for local authority accounts

This independent body is responsible for auditing Local Authority accounts, either by its own professional staff or by approved and appointed auditors.

How decisions are made

The decision-makers are the 46 members of Tayside Regional Council elected to perform this task. It is the Council officials' job to implement these decisions, and although they often present papers recommending a particular course of action, the final decision always rests with the elected members.

Decisions are arrived at through a net-work of committees and their sub-committees which are then ratified by a full meeting of Tayside Regional Council. Some matters are delegated to a specific committee to decide and go to the Regional Council for its information only. Delegated matters are decided at the annual review of Standing Orders - the rule book which governs Council procedure.

Broadly speaking, there are two types of committee - resource and service. Matters in the resource category include: finance, manpower, planning and development. Matters in the service category include: education, social work, roads, transport, water, recreation and tourism, police and fire.

Membership

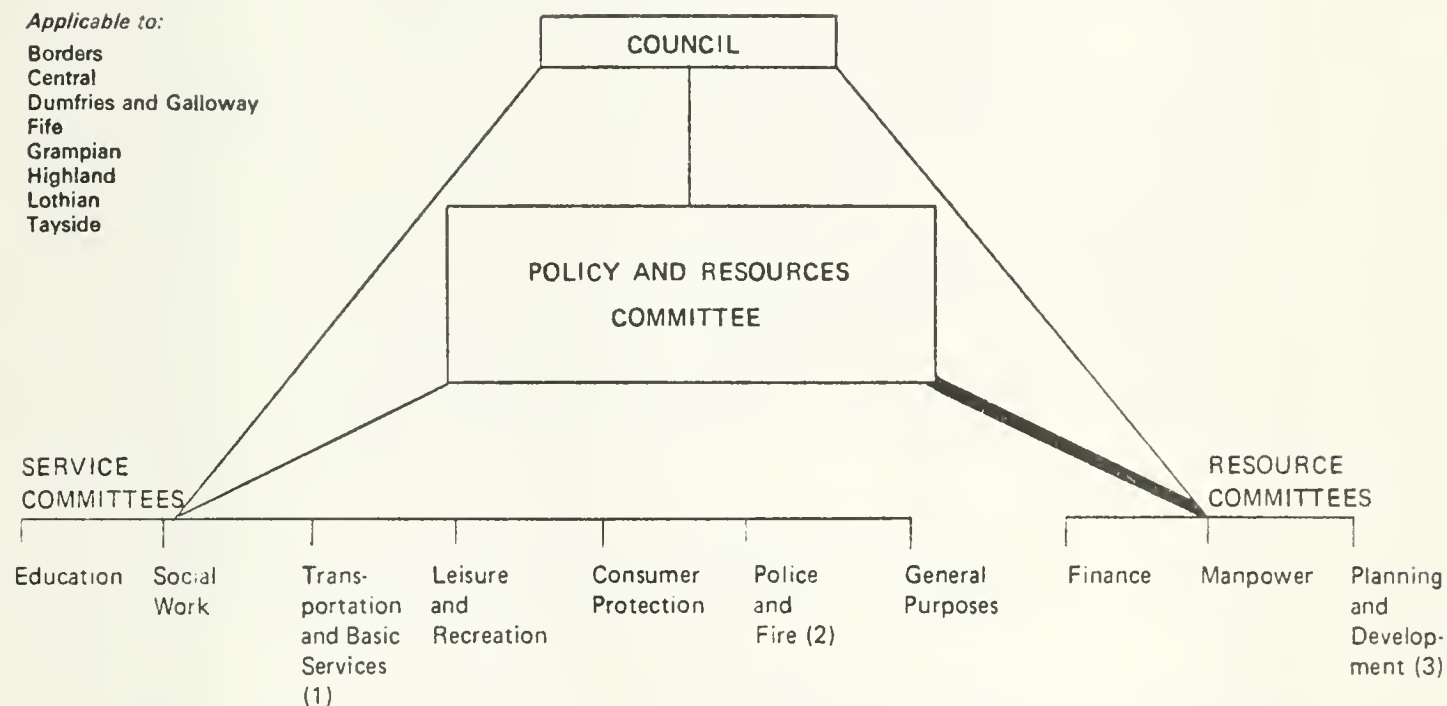
At present, all full committees, except education, have 21 members. Education has 28. The major standing sub-committees, sometimes called general purpose sub-committees, have 12 members - except education which has 19. The smaller sub-committees have between 4 and 7 members.

The political composition of the Regional Council is currently 26 Conservatives 14 Labour, 5 Independents and 1 vacancy.

The diagram on page K-28^a shows the Regional Committee Structure

Applicable to:

Borders
Central
Dumfries and Galloway
Fife
Grampian
Highland
Lothian
Tayside



¹ Except in Lothian, Grampian and Tayside which would have separate committees or sub-committees for roads, for sewerage and water and for public transport.

² Except in Highland, Borders and Lothian where there will be joint committees.

³ Highland, Borders, and Dumfries and Galloway would also require sub-committees for planning and building applications.

Diagram 1 REGIONAL COMMITTEE STRUCTURE

8-10

How decisions are implemented

The Senior Official of the Council is the Chief Executive and Director of Administration.

Principal officers of the council are:

DIRECTOR OF ARCHITECTURAL SERVICES
REGIONAL ASSESSOR, ESTATES OFFICER & ELECTORAL REGISTRATION OFFICER
CHIEF EXECUTIVE AND DIRECTOR OF ADMINISTRATION
DIRECTOR OF CONSUMER PROTECTION
DIRECTOR OF EDUCATION
DIRECTOR OF FINANCE
FIREMASTER
DIRECTOR OF PLANNING
CHIEF CONSTABLE
PUBLIC ANALYST
DIRECTOR OF RECREATION & TOURISM
REGIONAL QUANTITY SURVEYOR
REPORTER TO THE CHILDREN'S PANEL *
DIRECTOR OF ROADS
DIRECTOR OF SOCIAL WORK
DIRECTOR OF PUBLIC TRANSPORT
DIRECTOR OF WATER SERVICES

Each work through their own departments which together form the Regional Officer Structure This structure shown on the next page, has been modified, in the case of the Tayisde Regional Council, to include a Reporter to the Children's Panel, a Regional Quantity Surveyor, and a Public Analyst in place of a Director of Policy Planning.

The Structure and Functions of the Angus district Council

The structure that has been implemented at the Angus District level consists of a number of committees related as shown on the next page and having responsibilities for: Housing, Environmental Health, General Purposes, Leisure and Recreation, planning and Development, Policy and Resources, Industrial Development, and Appeals. These committees are supported by the District Officer Structure who implements decisions (also shown on the next page) and consisting of a Chief Executive Director of Administration and Legal Services, Director of Finance, Director of Technical Services, Director of Planning, Director of Environmental Health, Director of Housing, Director of Parks and Cemeteries, Director of Libraries and Museums, Director of Information and Tourism and a District Baths Manager. The operation of the various committees and departments are quite similar to what takes place at the Tayside level except that the subjects dealt with are different in some cases.

The financing of the District Councils activities is carried out in a similar fashion to the Tayside Council and these details can be gleaned from reference 9.

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